THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. CX. No. 2455.] LONDON, MAY 31, 1910. [62ND YEAR. PRICE 6d.

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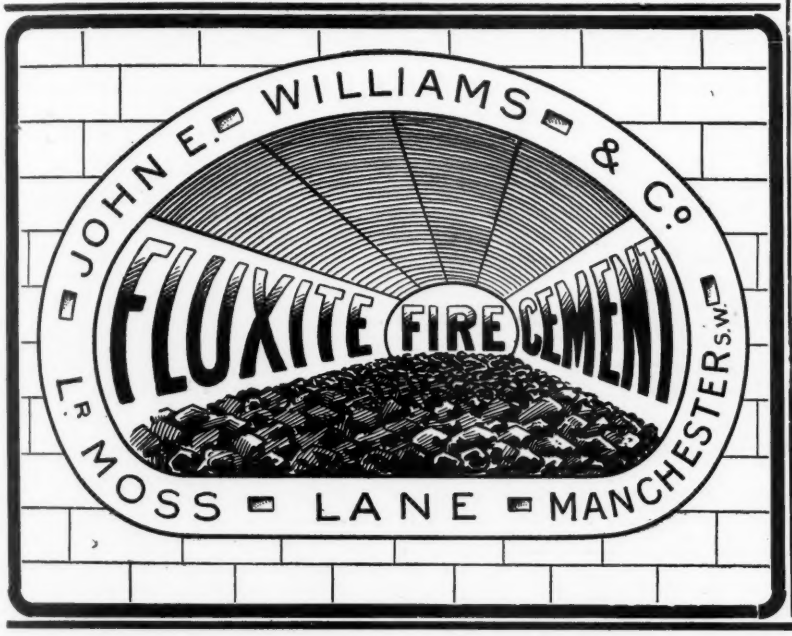

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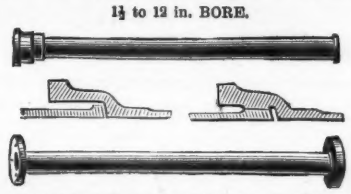

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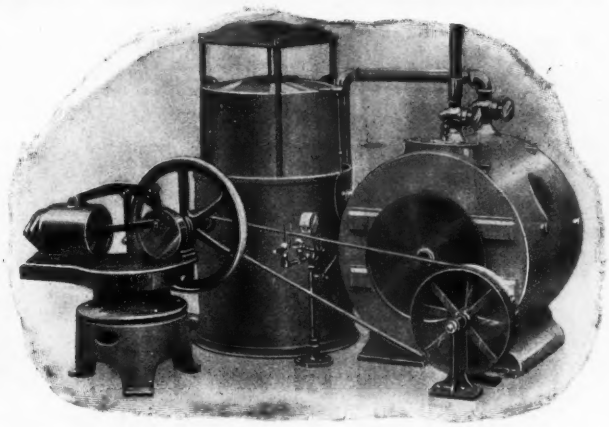

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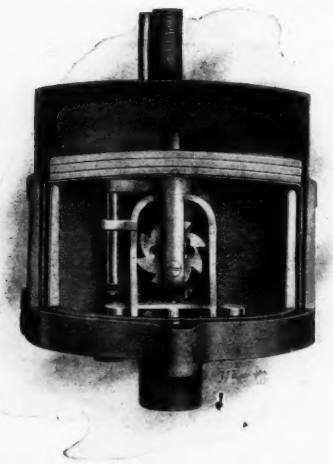

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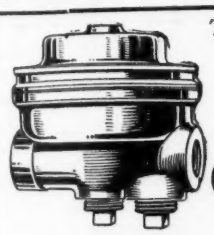

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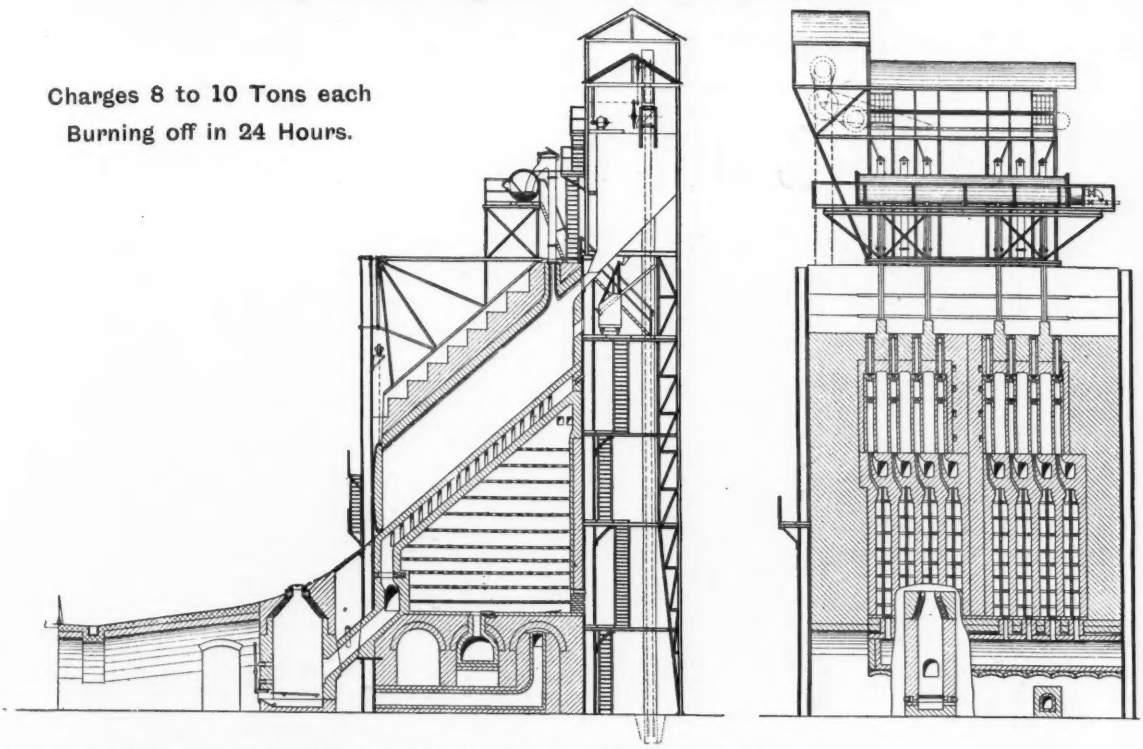

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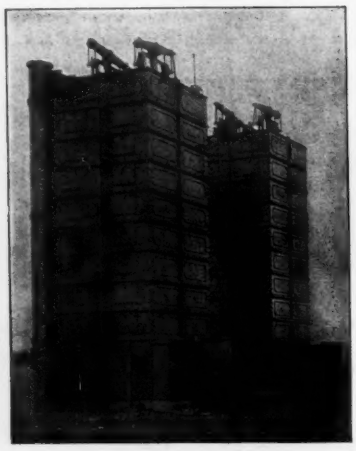

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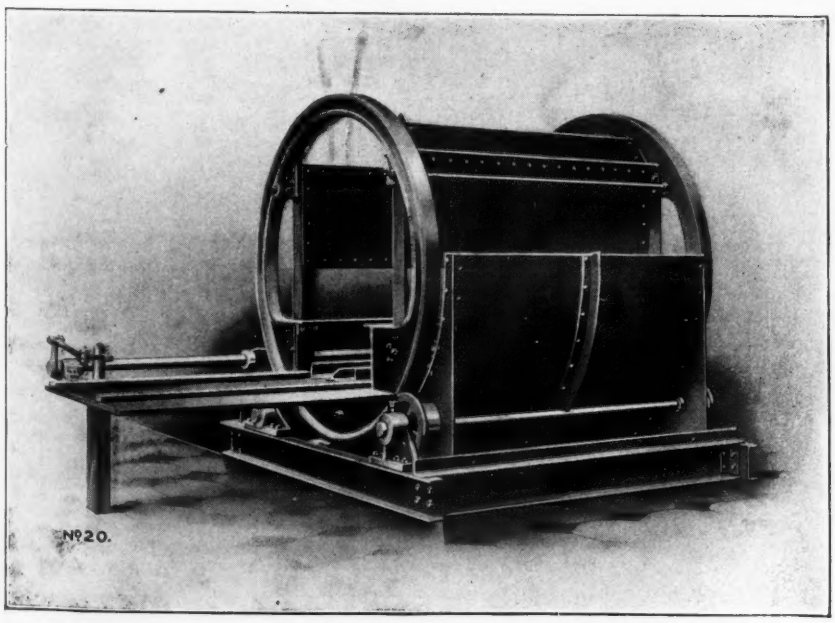

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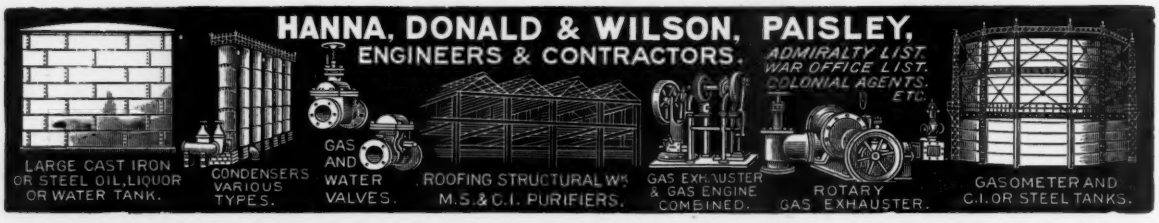
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CONTENTS.

EDITORIAL NOTES.

GAS, &c.—
Annual Meeting of the Gas Institution . . 541
A Full Programme at Burnley . . . 542
Gas Engineers on Municipal Competition . 543
Welcome Home—Why Is It?—Results at Birmingham—And Other Municipal Gas-Works—In Quest of Knowledge—Natural Gas in England—The London and Southern Junior Session 543

Gas Stock and Share Market 545
Electricity Supply Memoranda. 545
Death of Mr. Alfred Colson 547
Obituary 548
Institution of Gas Engineers—Programme of the Annual Meeting; Reports of the Council and of the Benevolent Fund Committee 549
Causes of Destruction of Refractory Blocks and Retorts. By Alfred B. Searle, Ph.D. 551
Purchasing Light 552
New Coke Plant at the Croydon Gas-Works . 553
Horizontal Chamber Settings 554
Cooker Plate-Racks 554
Illuminating Engineering Society—Annual Meeting 555
Control of Uniform Candle Power 556
Manchester District Institution of Gas Engineers—Meeting at Burnley—
General Business 557
Mr. J. P. Leather on the Installation of the Woodall-Duckham Vertical Retorts . . 560
Mr. J. L. Hodgson on Venturi Meters for Measuring Large Volumes of Gases . . 562
London and Southern District Junior Gas Association 564

LEGAL INTELLIGENCE.

Liability for Reinstating a Road 569
Affairs of the Mid Oxfordshire Gas Company—A Debenture Holder's Petition . . . 570

REGISTER OF PATENTS.

Production of Recoverable Ammonia in the Manufacture of Producer Gas—Masons Gas Power Company, Limited, Moore, Q., Cunningham, J., and Stokes, J. W. B. . . . 565
Treatment of Residues Obtained by the Burning of the Spent Oxide of Gas-Works—Williams, P. E. 565
Controlling the Supply of Gas—Rorke, T. J. & E. 566
Inverted Incandescent Gas-Burners—Sperryn, G. N. 566
Carburetting Gas—Tully, C. B. 566
Gas-Purifiers—Kölnische Maschinenbau Actien Gesellschaft, and Wegescheidt, C. . 567
Differential Pressure Gauges—Kent, W. G., and Hodgson, J. L. 567
Igniting and Extinguishing Gas-Lamps—Mowat, J. 568
Preventing Back-Lighting in Atmospheric Gas-Burners—Ehmann, C. P. 568
Utilization of the "Waste" of the Purification of Illuminating Gas—Simonin, H. . . . 568
Applications for Letters Patent. 583

CORRESPONDENCE.

Carbonizing Systems—Dr. Geipert's Reply to Mr. Harris 569
Calorific Values and High Temperatures. . 569
Naphthalene *v.* Choked Ascension Pipes. . 569
Burner Maintenance 569

MISCELLANEOUS NEWS.

The Lisburn Gas Arbitration 570
Manchester Gas Profits 572
Salford Corporation Gas Supply 573
Birmingham Gas, Water, and Electricity Supplies; Past Year's Results; Mr. Hilton Appointed Secretary and Manager . . . 573

MISCELLANEOUS NEWS (*continued*).

Nottingham Corporation Gas Department—Gas Profits Relieve the Rates 574
West Bromwich Gas Undertaking—The Past Year's Working 574
Leigh (Lancs.) Gas and Water Supply—Work of the Past Financial Year . . . 575
Evesham Corporation Gas Department—Annual Report 575
Tiverton Corporation Gas Undertaking . . 575
South African Lighting Association, Limited 576
Gas Stock and Share List 576
Monte Video Gas Company, Limited. . . 579
Notes from Scotland 580
Current Sales of Gas Products 581
Coal Trade Reports 582

PARAGRAPHS.

Brussels Exhibition 545
Personal—Electrolysis of Reinforced Concrete 548
Masonic 551
A Spacious Gas-Lighted Armoury. . . . 552
The New Building of the Institution of Civil Engineers—The Federated Gas-Works in the Potteries 554
Midland Association of Gas Managers . . 556
Additional Capital for the Newport (Mon.) Gas Company—Meters Limited 570
Gas-Works for Sumner (N.Z.) 575
Increased Consumption at Sedgley—Cardiff and the Rhondda Water Bill 578
Malta and Mediterranean Gas Company, Limited—Sales of Stocks and Shares—A Question of Books at Carlisle 581
Shrewsbury and the Burner Bill—Coal Carbonizing Company, Limited—Birmingham Boundaries Extension 582
Cookery Lectures at Cardiff—Extension of Ashburton Gas-Works—Reduction in Price at Bingley 583

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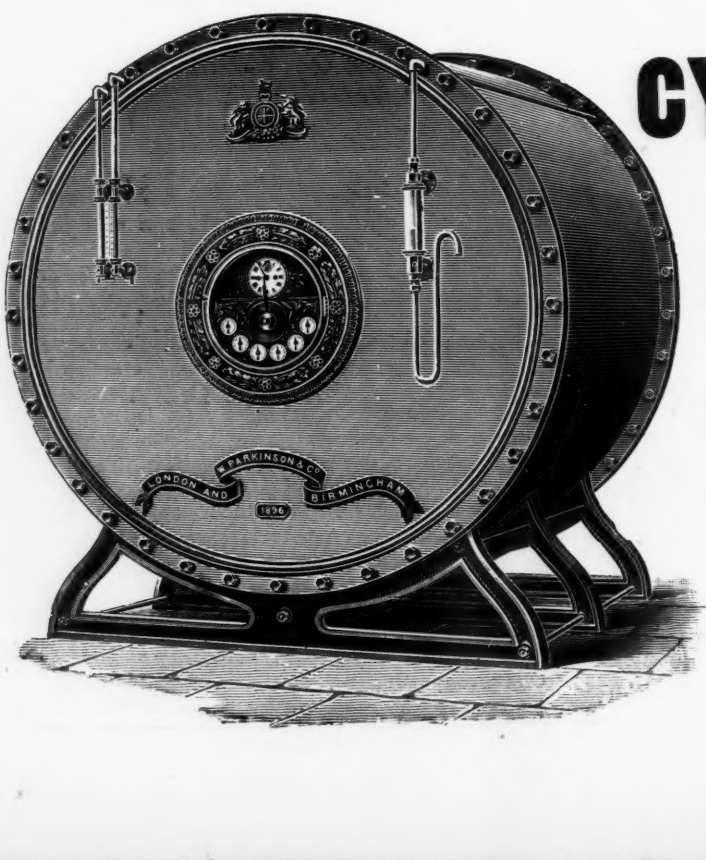

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EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON.

VOL. CX., No. 2455.—TUESDAY, MAY 31, 1910.

EDITORIAL NOTES—GAS, &c.

Annual Meeting of the Institution.

MEMBERS of the Institution have received the programme for the annual meeting to be held in London from the 14th to the 17th prox. Though shorn of one of its customary social features owing to the national mourning, the programme promises so much that has, technically and commercially, pre-eminence in thought at the present time that there may be the utmost confidence that the number of members the President (Mr. James W. Helps) will welcome from all parts of Great Britain and Ireland will be a considerable one. Take the programme through, it reflects, even in its bald sketch of the arrangements, the mutation that has come upon the gas industry. Both in manufacture and in commercial work, the past of the gas industry is almost a closed book. Little in either branch has any sequence or likeness with what has gone before; and, practically speaking, a new era has set in for the industry. It will be advantageous if this particular meeting is entered upon with the feeling of change uppermost, and with the feeling dominating the proceedings throughout. There is indeed great need at the present time for, in common assembly, the concentration of the minds of the executive heads of the industry upon the present position, in order to produce new directive influences.

The President will, we believe, in his Inaugural Address give the proper note to the proceedings. He incidentally, at a meeting of a District Association some time since, lifted the veil upon what he purposed making the chief topic in his deliverance. With a full sense of his responsibility as the titular head of the gas profession for the time being, he will, if his intimation holds good, attack the question of the sufficiency of the Institution—in its representative capacity, in its activities, and in its resources—to meet the needs of the gas industry in these days of technical change and increasing competitive pressure. Should his resolve of some months ago exist to-day, we hope most earnestly the result will be to put fresh breath, new life, and new activity into the gas industry as a whole. "Union is Strength;" and there is no doubt that what is now wanted in the gas industry, for future protection and for the maintenance of prosperity, is a more active spirit of co-operation, in both technical and commercial work. The way that work is being done at the present time, more or less effectually, in technical directions, in trading defence and business propagation, is not (we say it deliberately) economical, nor does it reach the highest possible point of efficiency. That has to be recognized, and united action has to be taken. The necessity of better organization and more united work will be emphasized when, at a conference of the Commercial Sections of the District Associations (to which all members of the Institution are invited), in the afternoon of the first day's meeting, the question of the systematic advertising of gas and cognate matters will be discussed.

Look again at the titles of the papers that are to be presented for discussion; and there we find further evidence of the changes that have to be met in these times. In public lighting, gas was at one time supreme. Economically and in point of efficiency, it is so now. But new influences have come into play. The bulk of the electricity supply undertakings of the country are municipally owned; and there is a growing eagerness on the part of the Electric Lighting Committees of such municipalities to subordinate the interests of the ratepayers to those of the electricity concern. And with what result is well known. But where competition has had a free field, with no favour to either competitor, gas has won new laurels, to the discomfiture of its competitor. It was so in Westminster. The Chairman of the Works Committee of the Westminster City Council is Mr. Jacques Abady; and Mr. Abady is coming before the Institution as an absolutely disinterested Municipal Councillor to deal with "Public Lighting from a Muni-"cipal Point of View." As a Municipal Councillor, Mr. Abady wants to buy illumination, no matter the source, for the streets—illumination subject to contract and measurement tests; and what he contracts for, he means to have. That is fair. It is a form of competitive business the gas industry is prepared to meet, but not the procedure to which it is subject through municipal ownership of electricity undertakings. We anticipate that the line of Mr. Abady's argument will be that of the purchase of illumination for street purposes; and his paper will give scope for a good examination of the whole public lighting question, and of the disadvantages under which the gas industry to-day operates through municipal possession of a competitive service.

Examining the titles of the other papers, there are the further emphases of change. Two communications are to be welcomed from America; but whether both authors will be present is for the moment an open question. A large field is before the gas industry in which to purvey gaseous fuel; and our friend, who has taken such prominence in gas commercial work in America, Mr. H. L. Doherty, is communicating a paper on the subject of "Gas as a Universal "Fuel." Fuel and calorimetry have intimate association; and in the latter there is a prospective, if not imminent, change that will require close watching by the technicians and administrators of the industry. Mr. J. B. Klumpp will tell us something about "Gas Calorimetry in the United "States." It is a subject that has been occupying a great deal of attention there of late, and upon which, it will be remembered, a Committee of the American Gas Institute have reported. Whether Mr. Klumpp will be in a position to add to the information in that report, we cannot say; but anyway it will be very useful to have before the meeting the views of our American friends. Reference to fuel and calorimetry, leads up to a feature of the work produced by a somewhat meagre display of united effort and finance. That is the report of the Gas-Heating Research Committee, which promises, according to an intimation in the report of the Council, to be a somewhat elaborate document. Small gas undertakings as well as those of greater magnitude have in these times their troubles and difficulties; and it will be interesting to learn what Mr. F. J. Ward, of Knowle, has to say on the general subject of their administration and working, and it will perhaps be still more interesting to hear what his contemporaries in the management of other small concerns will have to communicate in the discussion.

Turning to technical affairs appertaining to works and manufacture, the Carbonization Committee will present a report; but it will not be an extensive one. Unfortunately, but we are not surprised, they have failed (according to the report of the Council) in their endeavours to bring about a series of tests in parallel of the three prominent vertical retort systems; but some compensation will be found in a supplement that Mr. J. Ferguson Bell proposes to make to his paper of last year (for which, by the way, he is to receive the London Gold Medal) on the economical and productive value of heavy charges in horizontal retorts. There will also be a report by the Refractory Materials Committee; but not a complete one. That will come before the time arrives for making contracts for next season's requirements. But it must not be imagined that the Committee have been remiss in the duties entrusted to them. A unique investigation has been made of retort-setting temperatures; and a statement as to the result will probably serve as an interim report at the meeting. The report of the Council also speaks of interviews with the retort and firebrick manufacturers through the Society of British Gas Industries. Thus it may with confidence be expected that much value will emanate from the work of the Committee. The whole of the technical matters relating to works treat of carbonization in one form or another. Besides those we have

already mentioned, Dr. W. B. Davidson will be heartily welcomed by the members when he appears before them to detail the results and conclusions derived from "Experiments in Carbonization on the Birmingham Coal-Testing Plant." At the South Suburban Gas Company's works, there is a fine installation of De Brouwer stoking machinery and coke-handling plant; and Mr. S. Y. Shoubridge, the Company's Engineer, will in a paper describe the plant and the working results.

Though this will exhaust the technical and commercial topics to formally come before the meeting, there will be additional interest found in the same lines when the members and their lady friends visit the President's works at Croydon, where considerable extensions and changes have been made during the last few years. At Croydon, the visitors will be hospitably entertained by the Chairman (Mr. Charles Hussey) and the Directors of the Company. And though Mr. and Mrs. Helps are, under the circumstances of the time, foregoing the pleasure they would otherwise have obtained from the ordinary reception and entertainment, they will (by their invitation) be meeting the members and their lady friends at tea at the Japan-British Exhibition on the Friday afternoon.

Looking at the programme from the points of view of changed conditions and changed necessities, we do hope that much good for the gas industry generally will ensue from this particular meeting. At any rate, the President, we feel confident, will do his part in an effort to that end.

A Full Programme at Burnley.

The members of the Manchester District Institution of Gas Engineers had a very full day on Saturday last at Burnley, where they were received heartily and hospitably by the Gas Committee of the Corporation and their Engineer (Mr. J. P. Leather). Burnley, like Sunderland and St. Helens, will be a much-visited place by gas men for some time to come, for as Sunderland demonstrates the Dessau system of carbonization and St. Helens the Glover-West plant, so Burnley presents us with, on the large working scale, practically the latest development in detail of the Woodall-Duckham system. Members of the District Institution are to be congratulated on having within the province of their organization such installations of the two continuous processes of carbonization in vertical retorts. Only six months ago they were at St. Helens examining the Glover-West plant, and learning from the experiences there; and now they have had the like opportunity of seeing the Woodall-Duckham plant, and receiving direct independent testimony as to working. This alone would have provided sufficient interest for the meeting in Burnley; but a programme was provided that was altogether out of proportion to the time available for the business meeting. There was the paper by Mr. J. L. Hodgson on "Venturi Meters for Measuring Large Volumes of Gas," in addition to Mr. Leather's description of the Woodall-Duckham installation. Then the address delivered by the President (Mr. H. Kendrick) last February was down for discussion; and when the plethoric character of that deliverance is remembered, hours instead of minutes seem a more appropriate time to set apart for its discussion by a body embracing apt debaters in abundance. Even there the entries on the *agenda* did not finish. Other topics for consideration were the University scheme of the Manchester Junior Association, the education and the authorization of gas-fitters, and the Institution of Gas Engineers and the work of the Commercial Sections.

It was inevitable that there could only be a hasty flight over the subjects, or the postponement of some of them. And the result was the expected. The discussion on Mr. Leather's paper was a disappointing one; but this was probably due to two circumstances. The first was that, during the inspection of the bench of verticals, and the working generally, the informal discussion with, and interrogation of, Mr. Leather about exhausted the information the members desired to obtain; the second, that Mr. Leather's prepared contribution—through the fact that he had not had an opportunity of sequestrating the verticals from the ordinary works operations till two or three days before the meeting—stopped short just at the point where the visitors had looked for, and hoped to have had, particulars as to production, illuminating power, costs, and such-like data to which the usual criteria for judgment could be applied. However, Mr. Leather has experienced the difficulties usually incidental to setting a new plant to work. But it is gratifying to find that he is satisfied that the initial troubles have all now passed, and that he looks as hopefully as ever to obtaining the results he anticipated when the decision was arrived at to adopt the system. Information was elicited at the meeting as to the capital cost of the installation. This was stated to be equivalent to £125 per ton of carbonizing capacity, exclusive of the conveying plant. But this figure must only be taken for what it is worth as applying to the time the contract was entered into, and to Burnley conditions. Admiration was expressed for the progressive enterprise of the Burnley Corporation and the Gas Department. Burnley was to the front in the adoption of inclined retorts, and now lead with the Gaslight and Coke Company in the application of the first practical continuous system of carbonization. Among the members of the Manchester Institution, Mr. Leather and his Committee have well-wishers, who desire for them the realization of their hopes to the full. With regard to the lecture scheme promoted by the Manchester Junior Association in conjunction with the Manchester University, the senior organization gave it their endorsement and benison during the meeting, accompanied by a vote of material value. Approval was also granted to a proposal regarding the education and authorization of gas-fitters.

The paper by Mr. Hodgson is the second introduction in our pages of the real novelty in gas-works plant of which the author is joint inventor. The previous reference to the use of the Venturi meter for the measurement of gas appeared in our issue for March 29 last (p. 869), in the description then given of the extensions that had been made at the Bromley and Crays Gas-Works, where the first meter on this system had been installed by the Chief Engineer (Mr. William Woodward) in connection with the Humphreys and Glasgow twin-generator water-gas plant. The history of the evolution of the meter for gas-measuring purposes is an interesting one. For many years the Venturi meter has been employed in the measurement of water at several of the largest water-works in the country; and subsequent to its introduction for this purpose, it was developed by Messrs. George Kent, Limited, to a form suitable for the measurement of the compressed-air supply to South African mines. Now, through the instrumentality of Mr. Hodgson and the firm, with suggestion by Mr. Woodward, it has been applied to the measurement of gas; and Mr. Woodward's experience for some months in the measurement by it of carburetted water gas confirms the confidence with which he, after careful consideration, adopted the new invention. It should find a very useful field in gas-works equipment, not only on account of the lowness of the initial cost in comparison with ordinary station meters, but on account of the facts that it requires no special housing (the recorder can be placed in any available existing building up to a distance of 500 feet from the pipe-line in the open), and there are no working parts in the path of the gas flow to get out of order. But with all the advantages set forth in our previous description and in the more extended one that is now presented by Mr. Hodgson, it is too early to categorically assert that it will take the place on a gas-works of an ordinary station meter for the final measurement of the production of gas.

The principle of the new meter is fully explained in the paper; but briefly it is that the flow of gas is measured by the fall of pressure between the upstream and the throat of the Venturi tube. The gas engineer will examine the idea critically; and one of the first things that may raise doubt in his mind is as to deposit on the interior surfaces of the tube causing (as it were) a drag on the flow of the gas, and so accentuating the fall of pressure. The difficulty has been foreseen; and a steam or hot-water jacket round the throat and the upstream during the colder months of the year is the recommended preventive. An interchangeable throat—changeable at a moment's notice—can also be provided; so that there can be examination and cleaning if fouling is apparent. Then there is a disadvantage where there is any great variation in the flow, in that there is a line below which the recorder will not register; and though this only represents a low fraction of the full capacity (one-thirtieth), it might debar the use of the meter in small works. There again the use of two Venturi tubes—one large, the other small—would get over the difficulty. In that case, however, the capital cost would be increased; and it would constitute an important reason for raising the question as to the advisability of installing an ordinary station meter. But the objections, which, it will be seen, have been recognized and legislated for, have set against them various advantages that

are a strong commendation. An interesting feature is that the meters are constructed in three types. There are those which correct for both temperature and pressure; those which correct for pressure only; and those which, like the ordinary station meter, correct neither for pressure nor temperature. Mr. Hodgson thinks the last type of meter will probably prove most useful for gas-works; but Mr. Woodward at Bromley adopted the type that automatically corrects for variations in both temperature and pressure. We shall expect to hear more of this meter, which is likely to soon gain a further footing in the control by registration of gas-works operations.

Gas Engineers on Municipal Competition.

Instead of being at an ordinary meeting of shareholders of the South African Lighting Association last Wednesday, one might have fancied himself, both in regard to the personal and the subject-matter elements, at a meeting of one of the gas profession's organizations. The topic of discussion was the competition with municipal electricity supply, with its backing of the rates and ability, through personal and administrative influences, to transfer to itself important custom. The speakers in the discussion having identity with, or part in, the gas profession (in the order in which they spoke) were Sir Daniel F. Goddard, Mr. H. E. Jones, Mr. Alex. Mitchell, and Mr. Corbet Woodall; and these are names that will cause—the subject, too, being one that presses in many places—the proceedings of the Company on this occasion to rise to unusual prominence. The Company have suffered tremendously from the municipal competition of electricity; and, this coming at a time of a general acute depression in South Africa, resulted in the consumption of gas declining last year in Port Elizabeth by no less than 18 per cent. This is not due to any want of activity on the part of the Company's Manager (Mr. William Arnott). He has been very much alive to the situation; and he must have had a very perplexing time this last few years. Showrooms, lectures, demonstrations, and canvassing—all the customary methods of stimulating and developing business—have been, and continue to be, brought to aid in the effort to produce a counterweight of gain to loss. But the Municipality are powerful and influential; and the mere fact of garnering business at a loss does not affect them personally beyond their individual monetary responsibility as units in the general body of ratepayers. They have taken over the public lighting, the lighting of the public buildings, and the traceable connection between State and Municipality has formed the channel along which has flowed to the Municipal Electricity Department the important business of lighting the railway station and the General Post Office. Ordinary commercial principles do not apply under such circumstances; and how can the Gas Company, run on commercial lines, contend against such strange and monstrous conditions? Here, if anywhere, is found an excellent illustration of some of the effects of communism, in which private enterprise is pushed back by every unfair means and artifice. This is not the ordinary competition of trade; it is extraordinary. It hits the Company, as was pointed out in the discussion, in a double sense. It not only withdraws much of the cream of the gas business from the Company, but such loss handicaps the Company when competing in other directions, through—when there is any considerable loss of business—standing and other charges increasing per unit of gas sold.

Admittedly this South African case is an extreme one. But by such extremes an impressive portrayal is obtained of what is going on in this country by a more gradual process; and that enables one to take a better perspective view in the avenue along which events are moving. Now what is to be done? Mr. Jones believes the position can only be dealt with by spirited militantcy—by a substantial reduction of price, even, if needs be, to the sacrifice of dividend for a year or two; while Mr. Corbet Woodall and Mr. Alex. Mitchell are not satisfied this would be the wisest course. The competition really only affects lighting and power; and all three speakers look cheerfully to the future of the gas industry in both these respects. A critical position such as this municipal competition off ordinary commercial lines confessedly needs drastic treatment. But, however large might be a reduction of the price of gas, where such competition exists, the reduction would only have effect beyond and not within the limits of municipal influence. And outside those limits both Mr. Woodall and Mr. Mitchell really go with Mr. Jones part of the way in obtaining the remedy for application. Naturally the prices of both gas and electricity are heavy in South Africa; and have no comparison with charges here. But whether it be in South Africa or at home gas prices must, whatever the purpose, be on a competitive basis; and, if they are, all the engineers who took part in the discussion are satisfied that, where personal partiality does not prevail, and where municipal influences have no power, gas will retrieve much of the lighting that, for one reason or another, has passed over to the competitor. Where economy has no influence, personal preference cannot be controlled; and, of course, no one in the gas industry is so senseless as to say that gas, however economical and efficient as a lighting medium, will ever entirely wipe out electric lighting, any more than anyone—save a few prophets and visionaries—in the electrical industry, will say that electric lighting is going to eradicate from the field of illumination the economical and even popular gas lighting methods of to-day.

But the general feeling at the meeting was that a reasonable price—a competitive price—a price governed by local circumstances, for gas for lighting was all that was needed to meet ordinary competition; but as to the extraordinary competition of municipal bodies, no one seems to have any clear idea as to how customary and rational commercial principles can be twisted and directed to meet such conditions. Mr. Jones's idea of a price fight, with extreme reductions, will not, as we have said, help where municipal influence has sway; and what is more, at the best, the cutting down of prices—even if necessary, to the point where the dividend temporarily disappears—can only be of passing avail when a municipality is unscrupulous and has the ratepayers' pockets perpetually at hand. The resources of a company do not comprise any such unlimited pecuniary fount. But where there are such municipalities, every conceivable process must be brought into operation to counteract their designs and unconventional trading ways; and all the skill and legitimate arts of commercial life must be brought to bear upon the work of producing compensation for the losses resulting therefrom.

Welcome Home.

The many friends of Mr. James C. Watson, the Engineer of the Oriental Gas Company, and of Mr. Philip Holmes Hunt, the Engineer of the Metropolitan Gas Company of Melbourne, will be pleased to learn that they have both safely reached home on holiday, and in the best of health after their long journeys. Mr. Holmes Hunt arrived at Liverpool last Friday, and was met at Euston by his father, Mr. Charles Hunt, who, after his son's considerable absence and success in his profession in Australia, must have welcomed him home again with deep warmth and feeling. Mr. Watson is here on six months' leave of absence. It will be remembered that, at the last meeting of the Oriental Gas Company, the Chairman (Mr. R. Hesketh Jones) told the shareholders how thoroughly Mr. Watson deserved this extended freedom from the immediate cares and anxieties of his office.

Why Is It?

Special attention has again to be directed to the position of the Benevolent Fund of the Institution of Gas Engineers. This deserving fund, it is a sorry thing to have to say it, requires a good deal of periodical stimulating to ensure its maintenance. Is it that there are members of the Institution who are less humane than their fellows, or what is the cause? We do not know; but the fact remains that the fund is not, and cannot be, carried on free from anxiety and with that larger degree of benefit that the Committee of Management would desire. Last year ended with a deficit of £19 18s. 1d.; and the Committee were unable to deal with all the applications for assistance received at the close of the year. This is anything but satisfactory. Various expedients have been brought to bear to replace lethargy by interest in the fund; and now the effect is being tried of adding the Hon. Secretaries of the District Associations affiliated with the Institution to the Committee of Management, and provision has also been made for nomination by contributors for service on the Committee. The District Hon. Secretaries should make capital agents for the fund; and we hope the result will prove effective.

Results at Birmingham.

Just at this season of the year, the municipal authorities, whose accounts are usually made up to March 31, are always busy considering the financial results of their trading undertakings—in which category gas-works take a prominent, and practically without exception highly satisfactory, place. Already some few accounts have been noticed in our pages; and more call for attention to-day. There are both increases and decreases to be recorded; but the latter are in no case of a serious nature, and may be amply accounted for by slack trade conditions that have been prevailing in the period under review. To take Birmingham first, the figures in the balance-sheet were stated by Alderman Sir Hallewell Rogers, when submitting the Gas Committee's report to the Corporation, to be "very satisfactory, as they constituted another record." The contributions of the department for public purposes during the year reach the respectable figure of £92,000, of which no less than £72,500 went in aid of the improvement rate, and £4000 interest on reserve fund; while £15,500 was allocated in aid of public and court lighting. The receipts from the sale of gas amounted to £702,873, compared with £698,712 in the preceding year; the total income being £940,459, against £935,636. On the other hand, the expenditure was £750,525, compared with £745,335 in 1908-9. This left a balance of £189,934 to be carried to the profit and loss account, against £190,301; the net balance being £72,491, compared with £71,459. The quantity of gas sold shows an increase of 3·27 per cent. over the figure of the preceding year; while during the twelve months some 8000 new consumers were added. It might be remarked, said Sir Hallewell Rogers, that in giving so large a cash contribution to the rates, they were doing so at the expense of the consumers; but he would like to point out that, had the price of gas been the same as in 1908, their turnover would have been £45,000 more. Not forgetful of the need for giving credit where credit is due, he added that the good profits of the past year were due to various causes. In the first place, the late Mr. G. Hampton Barber bought his coal exceedingly well twelve months ago; and then the Engineers at the works had got the best out of the coal, and every member of the staff had worked excellently.

And Other Municipal Gas-Works.

Looking at some of the other statements that have so far come forward for publication, it is seen that an increase of 2 million cubic feet in the make of gas for the year is shown at Evesham; the net receipts from sales of gas being up by £270. Short time in the cotton trade has made its mark on the gas consumption in mills and factories at Heywood; but the receipts from gas sold for all purposes (£16,600, against £16,991) show a falling off of less than £400, practically the whole of which was represented by a reduction in price to prepayment consumers. The gas made per ton of coal was 11,068 cubic feet, as compared with 10,859 feet in the preceding year. The quantity of gas delivered in the twelve hours from six in the morning to six at night was 42·37 per cent. of the total. At Leigh (Lancs.) there is recorded an increase in the total quantity of gas sent out of 2·63 per cent.; the amount sold being 2·7 per cent. more than in the year before, which is stated by the Engineer (Mr. James Gibson) to be largely due to the progressive policy of the Gas Committee in fixing slot fittings. The make of coal gas was 11,110 cubic feet per ton. The income of the undertaking (£22,429) will, it is pointed out, be considerably lower in the current year, owing to a reduction in the price of gas for street lighting and to prepayment consumers; while the expenditure is expected to be higher. Once more (the seventh year in succession) the St. Helens Gas Department are handing over £5000 in relief of the rates; and the Engineer (Mr. S. Glover) is heartily congratulated by the Committee on his successful management of the undertaking during the past financial year. In spite of the slackness of trade, which caused a decrease of ½ per cent. in the output of gas, the profits amount to £9299, compared with £9112 for the twelve months before. A factor which is pointed to as having contributed to the economical working of the undertaking is the Glover-West system of vertical retorts. A reduction of £1185 in the receipts from sales of gas at West Bromwich is entirely due to reduced consumption for lighting purposes; and it is attributed, no doubt correctly, in a large measure to the indifferent state of trade and the adoption of newer and improved appliances for more economical incandescent gas lighting, both by manufacturers and by private consumers. As against this, more gas was supplied for power purposes; the result being a net decrease of 2·38 per cent. in the amount of gas sold when compared with the previous year. Out of 15,086 houses in the borough in November last, 11,369 were supplied with gas. The yield of gas was 11,414 cubic feet per ton of coal carbonized (compared with 11,141 feet), which is the highest figure that has been reached in the history of the undertaking. The Engineer (Mr. Harold E. Copp) states that this increased yield was due to less difficulty being experienced with stopped ascension-pipes. Breakages of lamps in parts of the borough are, we learn, so frequent that it has not been found expedient to fix incandescent burners.

In Quest of Knowledge.

If the Illuminating Engineering Society have done nothing more in the matter of tangible result during the past winter than to prove to the members how little they, and others who are concerned in the subject, know about the science and art of illumination, then credit must be given for having accomplished a good work, and for having created a desire to know more, and to push out into fields at present not thoroughly explored. We take it from Professor Silvanus Thompson's remarks at the annual meeting that this is the position; and it is a healthy recognition. When the members of such a Society are conscious of their own deficiencies, they can the better appreciate how far are those on whom fall the responsibility for the design and construction of buildings, and who have studied less the art of illumination, from a perfect understanding of necessities and requirements. The interest and co-operation of such men it is desired to enlist; and the Council have therefore determined that next session there shall be a number of practical papers on such questions as the lighting of streets, shops, libraries, schools, &c. In this, we think the Council are wise. They are likely by these means to secure the adhesion of a larger circle, embracing all interests identified in any way with interior and outside illumination. From the practical subjects, ascent can be made by easy gradation to the more technical and abstruse ones. It is much better than the reverse order of things for a new Society, which must, to make itself popular, arrange for attractive proceedings, and carry on its educational work from the points of general understanding. This is following the natural order of things. From the figures presented by the Hon. Secretary (Mr. Leon Gaster), it will be seen how unevenly divided at present is the membership between the various interests concerned in illumination; and this is a matter that the promoters of the Society must seek to alter by the attractiveness given to their work. Though the Society started on the principle of a "common platform," it cannot be denied that the influence of the promoters was more electrical than anything else. Hence it is seen that no less than 39 per cent. of the membership consists of electrical engineers and others identified with electric lighting; and only 18 per cent. gas engineers and manufacturers of gas appliances—the remaining 47 per cent. comprising professional men in other branches of scientific and industrial work and manufacturers of appliances, with, in all cases, some direct interest in illumination. Curiously, "architects, surveyors, &c.," are only represented by 3 per cent.; and there is the evidence lying around of incomplete knowledge in those directions. Such singularly disproportionate representation indicates that there is something wrong, and that something requires the application of a remedy. We are pleased the Society have prevailed upon Professor Silvanus Thompson to continue his presidency for another year.

Natural Gas in England.

Mr. William H. Booth comes before us with excellent credentials. He is a Fellow of the Geological Society, a member of the American Society of Civil Engineers, and the author of a book on "Liquid Fuel and its Combustion." This expert's advice to those who are thinking of falling victims to the alluring prospects held out by the (Sussex) Natural Gas Company promoters is "Don't." Mr. Booth knows the Heathfield district geologically as he knows his alphabet. And from an examination of the whole position, he says that, if gas is ever to be discovered in Great Britain, it would appear to be more rational to explore the deep-seated rocks of Cheshire, in hope of a store of gas being found that has been

evolved from the carboniferous rocks which probably underlie that county at a depth of some thousands of feet. But no hopes of commercial success by way of oil or gas can be held out for Sussex. So far, the gas appears to have behaved as would be expected of it. It is there; it is good in quality. But its volume is unlikely ever to prove large; and boreholes have shown that the reasoning of the writer and of others has not been far from the truth.

The London and Southern Junior Session.

The completion of the eighth year's work, finds the London and Southern District Junior Gas Association in a position which must be extremely gratifying to those who have worked so hard on its behalf. Such a large measure of success as the Association have attained, could not have been secured without effort; and the hearty vote of thanks which was accorded to the President at the annual meeting last Friday, was a well-deserved recognition of Mr. W. J. Liberty's unflagging zeal in the interests of the members during his two years of office. Following in the footsteps of other Presidents to whom the Association also owes a great deal—a debt which the members have not at the proper time failed to acknowledge—Mr. Liberty has fully realized the possibilities of his position. A feature of his presidency has been a systematic endeavour to increase the membership roll; and his plan of communicating with the engineers of works outside London has resulted in accessions from districts quite a long way from the Metropolis. In fact, as he pointed out at the last meeting, seeing the wide area from which the members are now drawn, the Association is in strict truth, as well as in name, a "Southern" Association. A list of 37 new members during the session is quite a good record; and though there were 23 resignations, this still leaves a net gain of 14. In his campaign to secure further supporters among the Juniors in London and the Home Counties, Mr. Liberty has possessed a strong argument in the excellence of the programme arranged for the session. An opening address by Mr. Corbet Woodall and lectures by Mr. Jacques Abady and Dr. Harold G. Colman, have been special features; and, in addition, several very useful papers have been read. Among the latter may be specially mentioned the contribution of Mr. J. G. Clark, of the Gaslight and Coke Company, on "Some Practical Aspects of Radiation; Having Reference to the Uses of Illuminating Gas." The preparation of this paper must have entailed a very large amount of work; and it is safe to say that the author's investigations on the subject with which he dealt have received careful consideration among a much larger number of men engaged in the gas industry than is comprised in the Association to which they were communicated. His reply to the questions asked during the discussion when the paper was read a month ago, will be found in another portion of this issue, as it will be remembered time compelled its postponement until the annual meeting. Numerous visits to works constituted a valuable portion of a programme which was a first-class one in every respect. In congratulating the officials and members on the work that has thus been accomplished, we may say that we look quite as hopefully towards the next session, which will be under the presidency of Mr. L. F. Tooth, of the Commercial Gas Company.

Brussels Exhibition.

We learn from the current number of the "Journal de l'Eclairage au Gaz" that, though the Belgian and French Sections of the Brussels Exhibition are far from complete, several firms have goods in position. The Compagnie Continentale pour la Fabrication des Compteurs à Gaz (M. Brunt et Cie.) show a "Duplex" meter of about a million cubic feet capacity intended for the Gas Company at Mons. The Compagnie Belge des Compteurs and the Imperial Continental Gas Association also show both wet and dry meters of various sizes. In the Machinery Hall there are engines of all kinds—horizontal and vertical—worked by ordinary or producer gas; noticeable among them being some high-speed motors which occupy but little space. In the grounds are special pavilions occupied by the Paris firm of Arthur Martin (gas-stoves, fittings, &c.) and the Auer Company of Belgium. The Belgian Association of Gas Managers have collected in a kiosk, decorated on the interior with a portrait of Minckelers, examples of various applications of gas for lighting, heating, and motive-power, coke-stoves, &c. The lighting of the exhibition is particularly brilliant; all systems—upright and inverted gas-burners of high and low pressure, and electric arc and incandescent lamps—contributing to produce a fine effect.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 576.)

THE Stock Exchange had a quiet and uneventful—not to say humdrum—week. There was, however, no tendency to weakness; a good, cheerful tone confidently awaiting the resumption of that activity which has not shown itself yet. A notable and pleasant feature was the advance in Consols, which closed with several bargains at 82¾. The opening day was good. The demand for gilt-edged investments hardened prices; and Railways were in request. But in some of the more speculative lines there was less strength. On Tuesday, the fortnightly settlement demanded attention; and it proved to be a fairly heavy one. The chief markets were quiet and generally firm; but the rest were somewhat uneven. On Wednesday, the tendency was cheerful; the settlement promising well. The Government issues were well supported, and Railways were still on the up-grade, while even the delicate American Market was stronger. Business fell quiet on Thursday, and there was some move to realize profits. Gilt-edged things did not suffer; but Railways were affected to some extent. On Friday, the settlement was satisfactorily concluded. Business was quiet and dull in most lines; but the choice class were strong, and scored some advances. Americans fell back again. Saturday was as quiet as usual. Consols advanced again, and Railways were stronger, but the rest were somewhat mixed. In the Money Market, there was a strong demand which hardened rates materially right up to the close. Business in the Gas Market was much more active in the aggregate; but it was more than usually restricted to a small number of issues in which all attention seemed concentrated. There were hardly any changes in quotations. In Gaslight and Coke issues, the ordinary was active and steady; the figures of the previous week being practically unchanged—that is to say, a range from 103½ to 104¼. The secured issues showed dealings in the maximum at 88¾, in the preference at from 104⅜ to 105⅜, and in the debenture at 82 and 82½. South Metropolitan was more active but unchanged, realizing from 120½ to 122. The debenture fell a point, and was done at 80½. In Commercials, the 4 per cent. fetched 107 and 107¼, and the 3½ per cent. 103½ and 104⅜. Among the Suburban and Provincial group, Alliance and Dublin changed hands at 82¼, British at 44 and 44¼, Ilford debenture at 100⅝, South Suburban at 122, and Tottenham and Edmonton "A" at 134½. In the Continental companies, Imperial was firm at from 177½ to 178¾, ditto debenture made from 94¾ to 95⅝, Union preference 139½, and European part-paid 18⅝ and 18 11/16. Among the undertakings of the remoter world, Monte Video realized from 12 1/16 to 13 3/16 *cum div.* and 12¾ *ex div.*, Oriental 139⅝, Primitiva from 7¼ to 7 7/16 (a fall of ⅛), ditto preference from 5 13/16 to 5⅝ (a fall of 1/16), ditto debenture 99¼ and 100, and San Paulo 15½.

ELECTRICITY SUPPLY MEMORANDA.

The Much-Abused Inspector—Landlords to be Responsible for Renewals—Gleanings from Contemporaries—The "Important Rays"—Artificial Presentment.

WHEN the electrical history of our times comes to be written, a prominent figure in it should be Mr. H. Ross Hooper, one of the Inspectors of the Local Government Board, who has shown that he has the courage of his convictions, and a very proper appreciation of his duties as an official of the Board. He does not believe (as our electrical contemporaries would have him do) that perfunctoriness and official duty and responsibility in any way harmonize. His thoroughness and frankness result in a large crop of anathema. But he goes on his way undisturbed by this; and the Local Government Board are, through him, relieved of the stigma of being a central authority in name only and not in act. Electricians would wish to have written up over the doors of the offices of the Local Government Board in which the affairs of the electrical industry are dealt with, "Ask and ye shall receive;" and they would have only one instruction to the Inspectors—*i.e.*, "Agree to all loans, and put no pertinent questions." The work of the Board in sanctioning loans must be reduced to a perfect farce before the managers of the electrical industry will be satisfied. But Mr. Hooper is not going to allow himself to be shackled hand and foot, or to be dumb, and merely nod his acquiescence. All the electrical papers that we have seen have had a shot at him over the Grimsby affair. The Corporation have asked for a loan of £2000 to squander in lighting certain side streets by metallic filament electric lamps, without gaining anything in the way of increased efficiency or annual economy. The electrical undertaking is in the hands of the Corporation; and the Public Lighting Committee and the Electrical Engineer are quite prepared to assert that a 63-watt metallic filament will give a light of 50-candle power, and will give a better illumination than any incandescent gas-lamp the running costs of which are on a par. Mr. Hooper—speaking with a big experience and observation in all quarters of the country—says he is not satisfied that these submissions are altogether true; and if Mr. Hooper is right in this, then there is no justification for spending £2000 to obtain something that is less efficient than that which is existing, while the annual price (ignoring capital charges) is the same. Before Mr. Hooper makes his recommendation to the Board, the Public Lighting Committee have

to show that the metallic filaments will yield an improvement in the lighting, and that it will be done as cheaply as gas. It is the old story. The claim is always advanced that the metallic filament lamp is going to make some wonderful difference in the illumination of the streets. It does; but the difference is a depressing one for those who have to use the streets at nightfall. Mr. Hooper also questions the reputed durability of metallic filament lamps. The Electrical Engineer of Grimsby says that he has lamps that show a life of 1900 hours. What is the good of quoting such a figure? Do electrical engineers think Mr. Hooper is going to be deceived in that way? Such life figures are not representative of the whole genus. If one takes the average of the life figures of a street installation of metallic filament lamps, it will not be represented by anything like 1900 hours. Electrical engineers know this; and their knowledge is that of Mr. Hooper, who has a marvellous way of keeping himself above the accretive heap of abuse.

Electrical committees appear to have very simple notions as to what people are prepared to do to help forward the interests of the electrical industry. If an electrical undertaking were some philanthropic institution instead of a commercial venture, they could not expect people to do more for it, without grumbling. The Electricity Committee of Fulham have been considering how they can supplement the custom of their undertaking, which indicates that they have been making slow progress. In the borough, there are 22,000 houses; but only about "3000 electricity consumers, including flats" (it is most unkind to suggest that the "consumers" include "flats"), are connected to the mains. The Committee (the Council have endorsed the proposal) intend to free wire for approximately six lights per house—using prepayment meters, and surface wiring, which is ugly. The estimated capital cost of the wiring and supplying fittings, including a transformer, is £3 3s. per consumer. Here comes one drawback to the scheme. That is the old question of responsibility for renewals. It is difficult to get the poorer class of consumers to renew; and so the Committee say that only when the landlord accepts responsibility for all renewals (other than those necessitated by ordinary wear and tear) can the supply of the requisite lamps be included in the scheme, and, failing an undertaking by the landlord, the tenants will be required to provide their own lamps. That is one rock on which the scheme will come to grief. There have been several instances in which it has been proposed to get landlords to shoulder the responsibility for electric lamp renewals; but we have never been able to learn how many soft-headed landlords have been hooked in this way. However, the Fulham Council are going to make a trial by spending £2000. Good-bye to the profitable use of that particular sum.

Some of our electrical friends have been critical lately; and, as they generally do when the fit for this sort of thing comes upon them, they have been falling into all sorts of errors, and making some singularly random statements. In a paragraph to which thoughtfully as little prominence as possible is given, the "Electrical Times" questions our veracity in stating that the latest forms of high-pressure inverted gas-lamps give an efficiency of 60-candle power per cubic foot of gas. The sarcastic individual who penned the paragraph can only dispute the assertion by the aid of his chief characteristic. Our declaration is not a difficult one to prove in a practical manner if the writer of the paragraph so desires. We also, in his view, appear to have erred in omitting to insert the word "hours" after candle power. This assumption of photometrical erudition is amusing. Among photometrists, when one speaks of an efficiency of no matter the number of candles or candle power per cubic foot of gas, it has been, and is, always understood to mean the candle power per cubic foot of gas consumed per hour. And such criticism as that in the "Electrical Times" passes in its office for technical journalism! In the "Electrician," reference is made to a recent article in the "JOURNAL," regarding the use of small gas-lighting units in houses. One of the points of usefulness of small lighting units suggested by us was that of economically maintaining a brightness and comfort about a house by having a light in almost every room. The profundity of our contemporary's comment on this is absolutely staggering. Read and judge: "We fail to *see* how the inmates can *see* the house look brighter unless all the doors are thrown wide open; whilst the effect on the atmosphere of a gas-jet in every room is not pleasant to contemplate." The first part of this quotation may stand as a piece of simplicity of the first water; and as to the second part, we should like a practical explanation. Let the writer of the words take an ordinary house of any specified cubical capacity, and tell us by illustration what he has in mind that is not pleasant to contemplate. Many houses are night after night lighted throughout by gas; gas lighting has been in existence over a century; and the civilized races are not extinct. If they had been cleared off the face of the earth by gas lighting, there would have been no electrical industry, no need for all the struggling that that industry has been experiencing the past thirty years, and—perish the thought!—there would have been no "Electrician," no "Electrical Times," and we should not have been here to enjoy the occasional flights of imagination that find expression in their pages. Another curious error into which our contemporaries have been falling is that they seem to regard the Welsbach Company as the only mantle-making concern in the world; and the justifying remarks from Lord Weardale, at the recent meeting of shareholders, for entering into the metallic filament lamp business have been hailed with much joy, and have, like a well-known brand of cocoa, produced a "grateful and comforting" feeling. Turning from our electrical contemporaries to "Surveying and Civil Engineering," we find there a friendly article headed "The Case for Gas," in which appears these words: "Who could have prophesied twenty years ago . . . . that a great revival would take place in the use of gas, or that gas was again to assume its rank among the prominent illuminants." Though, over a great number of years, we have endeavoured, with scrupulous care, to keep ourselves *au courant* with all that is passing in the lighting world, we never before heard that gas ever lost its rank among the prominent illuminants. That piece of information has escaped our notice.

Various people have different ways of doing things. The electrical people have at times introduced some curiosities in the way of photometrical measurements. We have heard of such things as taking the candle power from the four cardinal points, and giving the sum of the measurements as the candle power of the lamps. Then, again, we were told by the "Electrician" only lately that the ratings that have appeared on electric lamps are notoriously not their actual values; we know too about the discordant illumination measurements for which electricians have been responsible; and we know also that they have a nasty habit of not using incandescent gas-burners in the manner that will give their utmost efficiency when taking photometrical measurements, but allowing them to run wild as it were, and then finding out what they will do. Not long ago, an attempt was made, at the Society of Arts, to measure from the floor the illumination of the large sun gas-light in the ceiling—an ancient contrivance that had not been used for ages, with the flat-flame jets throttled with the dust and the rust of time, and the pipes obviously filled with air. This experiment, without explanation, was regarded as a fair matter for sarcastic comment in the "Electrical Times"—so hard-driven are our friends for matter for derogatory talk in connection with the latest developments of gas lighting! Mr. Haydn Harrison was the experimenter. The same gentleman presents us with a further innovation in photometrical measurement. It is that by measuring the "important rays" of electric lamps, a considerable increase in efficiency can be obtained. Mr. Harrison should be proclaimed a benefactor to his generation of electrical illuminating engineers. There has been hopeful talk of a 0·5 watt per candle power metallic filament lamp; and Mr. Harrison points out that such lamps are already with us if the "important rays" are measured, and the others discarded. At Croydon, grouped tungsten lamps are being used in lanterns; and the total number of watts absorbed is 300. Photometrical tests show that "the candle power on the important rays is raised to over 500 by means of a special registered design of reflector." That is all. Perhaps some gas enthusiast will make a selection of the "important" from the unimportant rays proceeding from our latest types of high-pressure gas-lamps; apply special types of reflectors; and then ascertain what the efficiency of the "important rays" is per cubic foot of gas consumed. We recommend the experiment to those who have time to dabble in photometrical disuniformity and fictitious values.

The Electricity Publicity Committee is hard at work producing posters and show and other cards containing some striking absurdities, by trying to eliminate the practical in order to make the use of electricity look as artistic and artificial as possible. We have not seen the posters or the cards, but are quite willing to accept the following criticism from the "Electrical Times:" "Another of the Committee's show-cards has now been published. It sets out to illustrate electric ironing, and forms the first of a series dealing with the uses of electricity for domestic purposes. The poster (which is 40 in. by 25 in. in size, and is in five colours) is of a design to make an effective display on the hoardings; but what will the good housewife who gazes at it think of the elegant young lady who chooses a polished Chippendale table to do her ironing on, and that without even an ironing-cloth to protect it! Art is all very well, but a picture of the real thing is much more impressive to the matter-of-fact person, such as the average middle-class housewife usually is. Besides the poster and a show-card similar to it, there is a mail-card also illustrating the electric iron. If one may criticize this also, the two-light bracket on the wall panelling is in dangerous proximity to its mistress's head—most people have their wall brackets well above the height of the average person's head. The young lady who is ironing in this picture has also chosen a most unsuitable table, and again dispenses with the table protection. The aim of the poster and the show card is to get people who are already consumers for lighting to use it for other purposes. . . . The circular and mail-card should be of considerable service to supply undertakings, since they provide the material for advertising in a most useful direction without incurring any expense in distribution. They mark a distinct step in electricity advertising of this kind, in that the three-colour process has been used—this being usually considered too expensive for matter on a small scale. With the big issues which the Joint Publicity Committee can make, however, we may probably look forward to seeing further high-class productions in this method, since it is so eminently suited to the needs of the case. Let us hope, though, that in future pictures the incongruity of the *mise en scène* may be removed."

A combined water tower and tank has been built of concrete blocks near Brussels, where it is to be used in connection with the International Exhibition. The tower and tank have a height of 145 feet, and the latter has a capacity of 280,000 gallons. The structure is circular, and is built entirely of concrete blocks.

OBITUARY.

ALFRED COLSON.

From among the living, there has passed one whose removal we all profoundly deplore. Last Friday morning, Mr. Alfred Colson breathed his last; and no more shall we look upon that tall spare figure, with its grave but kindly face, no more will there be the hearty grip of the hand, no more the enjoyment from the same source of that courtesy which was an inseparable characteristic, no more those animated conversations on themes of mutual interest. All has passed. The voice is still; the life spent. For some time past, it has been known that our deceased friend had been suffering, and that for a period he was in a nursing home in London. It has also been known that after his return to Leicester his condition was such as to cause grave concern to his family and medical advisers; and in the earlier part of last week, the fear became pronounced that there was little hope. The fear was all too well-founded.

Though Mr. Colson in his professional activities did not get far afield, his personal and professional influences were great. He was richly endowed—humanly and mentally. Those native qualities of which we have spoken drew men to him. His was a nature that made friends; and his was a nature that retained the friends he made. He knew how to deal with those with whom he came into contact; and he also knew how to lead. *Suaviter in modo, fortiter in re* applied to him without qualification. His gifts served him, and those for whom and with whom he worked, well. His talents would not permit him to linger about the lower rungs of the professional ladder. He could no more resist working his way to the top than he could resist those natural impulses that contribute to the maintenance of life. For long years, he stood a conspicuous figure in the professional ranks of the gas industry; and for long years the name of Colson has been honoured and held in the highest esteem. His engineering ability was great; as was also his chemical knowledge in the sphere of gas-works products. He knew how to construct works with economy, and with a large reward in efficiency. The Aylestone Road works at Leicester are a monument to his skill and ingenuity. His ability was by no means circumscribed. It was capable of much and ready expansion. Not only was he Engineer of the gas undertaking, but when the Corporation entered upon the business of electricity supply, he dropped into the engineering and management with perfect ease. Between the two undertakings, he exercised a circumspect management; and he made of both a success. He served Leicester well; and Leicester has cause to regret his loss, just as much as has the gas profession, though the profession of late years, through the busy unostentatious life Mr. Colson led, has not seen so much of him as would have been universally preferred. He had his share of trial, domestic and otherwise; and it left its marks on a sensitive and kindly nature. He leaves one of his sons—Douglas—in the responsible management of the gas-works at Weymouth. With him and with all the family, the members of the gas profession in common mourn.

The late Mr. Colson was born at Newport (Mon.), on Jan. 31, 1849. His father—Mr. Henry Colson—was one of the Engineers of the London and South-Western Railway Company. The son was educated privately; but his school work was directed to fitting him for the engineering profession. He was articled to his father; but he removed to the Metropolis, and commenced his career with Messrs. John Aird and Sons. In 1871, he was engaged by Mr. Robert Morton, the Engineer of the London Gas Company, as Clerk of the Works for the construction of the first gasholder at Battersea, to serve as an adjunct to the Nine Elms works. At that time, Mr. Charles Hunt was in the Company's service at the works; and from what he saw of Mr. Colson he formed a high opinion of his energy and ability. In 1872, Mr. Hunt went to Birmingham; and in the following year it was decided, upon his recommendation, to appoint an Assistant Engineer to the Birmingham Gas Company. Mr. Colson obtained the appointment; and during the next ten years he was closely associated with Mr. Hunt in the management of the Windsor Street works, and fully shared his counsels. That period covered the construction of a very large portion of the new works.

In 1882, the position of Gas Engineer to the Corporation of Leicester became vacant by the retirement of Mr. C. S. Robinson; and Mr. Colson, who was then about 34 years of age, applied for it, and was unanimously selected by the Committee who examined the applications. When recommending him to the Town Council, Alderman Bennett, the Chairman of the Gas Committee, laid stress upon the value of Mr. Colson's experience under Mr. Hunt at Birmingham, where, he said, every attention had been given to the most scientific and economical means of producing, purifying, and distributing gas. Mr. Colson had also paid special attention to street lighting; so that his experience and advice would prove serviceable to the town. The Committee's selection was unanimously confirmed by the Council. Before leaving Birmingham, Mr. Colson was presented by a number of the officials and employees with a handsome centre-piece, bearing a suitable inscription, two *compotiers*, and a dessert service of white china, accompanied by their congratulations on his appointment and their best wishes for his success. Mr. Hunt presided on the occasion; and among those present were Mr. Henry Hack and Mr. Shoubridge. Writing to us last Saturday on the subject of Mr. Colson's death, Mr. Hunt, to whom we are indebted for some of the preceding particulars, said: "I never parted with more regret from anyone who has been similarly associated with me. The ten years at Windsor Street gave full promise of the conspicuous success which awaited him."

On taking up his duties at Leicester, Mr. Colson entered most enthusiastically into the work of developing the gas undertaking; and at a meeting of the Town Council held early in 1883, Mr. Bennett stated that the new Manager was fulfilling the expectations of the Gas Committee. His experience at Birmingham was proving of great value; and his devotion to duty was admirable. He first of all took steps to develop the consumption of gas by writing a little pamphlet on its advantages for cooking. The publication of this *brochure*, of which something like 30,000 copies were sent out by gas authorities in various towns, was attended by most satisfactory results. The next thing was to improve the manufacturing plant, so as to render it equal to meeting the increased demands upon it. Consequently, early in 1884, he submitted a long report on the extension of the Aylestone Road works, at an estimated cost of about £26,000. In the following year he directed the attention of the Gas Committee to the inadequacy of the chemical plant, which was contiguous to the works at Belgrave Gate, and emphasized the necessity for the establishment of new residuals works. These were eventually carried out according to his designs and under his superintendence, at a cost of upwards of £20,000. They cover about 3½ acres of ground.

Owing chiefly to the more extended consumption of gas for industrial purposes, the demand so increased that in 1887 Mr. Colson was again compelled to advise the Corporation to undertake further enlargement of the works. The designs for these works, which were carried out entirely by him, were approved early in the above-named year; and he was congratulated on the able statement he had submitted on the subject. The extension consisted of a section capable of manufacturing and storing 4 million cubic feet of gas per day, and costing about £150,000. Subsequent extensions included the erection of new offices and shops, &c., in Millstone Lane. In 1890, the Corporation obtained power to supply electricity; and Mr. Colson was appointed as Engineer. Buildings to contain the necessary machinery for the generation of current were put up under his superintendence; and the supply was commenced in December, 1894. Three years later, further large additional expenditure on the Aylestone Road works was sanctioned; and the necessary parliamentary powers were obtained. In the summer of 1899, water-gas plant was introduced, as the result of a visit of a deputation of the Gas and Electricity Committee, accompanied by Mr. Colson, to places where it was in use. Coming to more recent times, it may be mentioned that two years ago the Corporation were applying for further powers in connection with their gas undertaking, including an extension of the area of supply and the application of modern gas-testing clauses. To these, the Police and Sanitary Committee, who considered the Bill, had no difficulty in assenting, after Mr. Colson had shown the excellent position of the undertaking and its development in the past thirty years. Some idea of the progress of the Gas Department under his management may be formed from the following figures: In 1882, the quantity of coal carbonized was 62,000 tons; of gas made, 650 million cubic feet; and the consumers numbered 20,000. Now the figures are 180,000 tons of coal, 2100 million cubic feet of gas, and 58,500 consumers.

All through Mr. Colson's long connection with Leicester in his official capacity, his services were fully recognized by the Corporation. He had not been four years with them when he received an increase of salary, in consideration of the work entailed in carrying out the large extensions at Aylestone Road, and in doing this without any engineering or architectural assistance. Another increase was granted a few years later. In the summer of 1891, he was invited to take charge of the Beckton station of the Gaslight and Coke Company; but, while highly appreciating the compliment, he felt it to be his duty to remain at Leicester, in consideration of the kindness and appreciation he had received from his Committee, and in view of extensions in progress at Aylestone Road. Next year, his salary was raised to £1000 per annum. While Mr. Colson was a strict disciplinarian, he was always exceedingly just and fair to all who worked under him. He was a man of very high character, and while earning the complete confidence of the Committee under whom he served and the staff who served under him, he at the same time gained the esteem of all who knew him. His concern for the employees was specially shown at the time of the South African War; and in the spring of 1904, those who had been on active service presented him with a silver Irish loving-cup, in gratitude for his generous thought in safeguarding their interests while they were abroad. Early in 1901, he had to bear very heavy trouble brought about by having his works flooded. Photographs given in the "Journal" at the time show the serious nature of the inundation; but in these trying circumstances he was loyally supported by the staff and workmen. Almost his last words were the expression of a desire to be kindly remembered to the Committee and the staff with whom he had been so long associated. He was the President of the Ambulance Corps connected with the Gas Department. His usefulness in Leicester was not confined to his professional work. In October, 1898, he was elected as

President of the Literary and Philosophical Society; and his year of office was a very successful one. On the occasion of the meeting of the British Association at Leicester in 1907, he was Chairman of the Reception Committee, and did much useful work for the entertainment of the members and visitors.

A conspicuous feature in Mr. Colson's career was his solution of the naphthalene problem at Leicester. Prior to 1904, the complaints received in regard to stopped pipes ranged from 100 to 600 a day; but, after many experiments, he succeeded in completely removing the cause of the trouble by the treatment of the gas with light creosote oil. The publication of the particulars of the process and the results obtained with it gave rise to much correspondence in the "JOURNAL" at the time. Another useful device for which the gas industry are indebted to Mr. Colson is his prepayment meter cash-box, which was described and illustrated in our "Register of Patents" on Oct. 23, 1906, and was the subject of an article early the following year.

Mr. Colson was always interested in the problems which came before his professional colleagues; and early in his career he endeavoured to assist in their solution. With this object in view, and with a desire to extend his knowledge, he joined the British Association of Gas Managers in 1876, while he was at Birmingham, and in due course passed into the Gas Institute; but he left with other members to form the first Institution in 1891. He was a member of the Council of the new organization, and President in 1894. At the first meeting, he read an interesting paper on "The Leicester Gas-Works Extensions." On the amalgamation of the two bodies, he joined the new Institution, and at the second annual meeting (in 1904) read a paper giving the results of his "Ten Years' Experience with the Prepayment Meter at Leicester." His name was on the list of members at the time of his death. He was one of the oldest members of the Midland Association of Gas Managers, which was founded in 1877, with his Chief (Mr. Charles Hunt) as first President. In 1886, he read a paper on "Letting Gas Cooking-Stoves on Hire;" and it was followed next year by one on "The Leicester Gas Undertaking." This was the first occasion of an association of gas managers visiting Leicester; and Mr. Colson gave his colleagues a very interesting account of the undertaking. He was elected an associate member of the Institution of Civil Engineers in 1876, and was transferred to the class of members in 1889. He was also a member of the Institution of Electrical Engineers.

Mr. Colson came from a family of engineers. As stated at the outset, his father was a railway engineer. One of his brothers was for a long period principal agent of Messrs. John Aird and Sons, for which firm he constructed many important works; and another brother is Mr. Charles Colson, C.B., an Engineer to the Admiralty. He also has, or had, two other brothers in the engineering profession. He was twice married. His first wife, by whom he had one daughter, who survives him, died when he was at Birmingham. He also leaves two sons and one daughter by his second marriage; another son having been killed by an accident some years ago. One son—Mr. Douglas F. Colson, who was at one time his chief Assistant—as mentioned in our introductory remarks, is Engineer and Manager of the Weymouth Gas Company; and the other is in the Army. The youngest daughter is married to an officer in the Army.

The preceding sketch of Mr. Colson's life-work cannot be better closed than by giving two appreciations of him. His former Chief, Mr. Charles Hunt, says: "He was every inch an engineer. Although by instinct and training he was essentially a constructing engineer, it should be recorded of him that he showed very marked business capacity as Manager of a gas undertaking, and also adaptability in other directions. For example, one of the first things he had to undertake at Leicester was the working up of residuals, as to which he had had no previous experience. He applied himself to this with such success as to speedily earn a name for himself as a tar distiller, in which capacity his advice was for many years sought in connection with other gas undertakings. Similarly, he took up electricity, the success of which department of the Leicester Corporation is largely to be attributed to its being united with the Gas Department under his management and control."

Referring to the death of Mr. Colson, the "Leicester Daily Post" on Saturday said: "The Corporation has lost one of the ablest and most successful officials on its staff. During the twenty-eight years he was the Engineer of the municipal gas-works, he rendered services as remarkable as they were invaluable. When the visitors to St. Paul's inquired for a monument to its distinguished Architect, they were told to look around. So with Mr. Colson. He leaves behind him no more commanding and eloquent memorial to his achievements than the gas and electric lighting works at Aylestone. From time to time they have been visited by some of the most eminent members of his profession; and their emphatic verdict has been invariably the same. The entire undertaking is a model of its kind. Again and again has it been extended according to the designs which he not only matured but carried out. The result has been that its production has been raised from 650 million to a colossal 2106 million cubic feet of gas, and the consumers have bounded from 20,000 to 58,500. The municipal profits have grown in proportion, and have been found side by side with repeated concessions to the consumers. Throughout his career, indeed, Mr. Colson demonstrated in many ways that he was in the front rank of his profession. One of the more striking proofs of this was the remarkable success with which he grappled with the naphthalene problem. When, again, the Corporation determined to generate its own electric light as well as the older illuminant, instead of allowing the monopoly to pass into private hands, it found Mr. Colson admirably qualified to launch and manage the new installation. Few can be surprised, therefore, that he should have been elevated to the chair of the Institution of Gas Engineers, as well as widely recognized as one of the most distinguished consulting experts on gas-works management. He did not, however, confine his interest and efforts to his profession. In the work of the Leicester Literary and Philosophical Society, of which he became President, in the reception (still pleasantly memorable) of the British Association in 1907, and in other spheres of local activity, he did exceptionally useful service. Adding to these his admirable traits in the management of his workmen at the gas-works, his scientific attainments, his remarkable culture, and other characteristics, we have some of the secrets of the respect and esteem he inspired, as well as of the sincere regret now evoked by his death."

Professor ROBERT KOCH, the eminent bacteriologist, died last Friday night at Baden-Baden, whither he had gone for change of air after an attack of heart trouble. His name frequently appeared in the "JOURNAL" at one time in connection with water examinations. He was in his 67th year.

The Wandsworth and Putney Gas Company have lately lost one of their Directors in the person of Mr. EDWIN R. RANSOME, who joined the Board in 1873, and discharged his duties with zeal till his death, which took place at the advanced age of 87. Deceased was a member of the Society of Friends, and he was interred in the little burying-ground behind their historic Meeting-House in High Street, Wandsworth. Many Friends who honoured his life and will treasure his memory gathered with his family round the grave; among those present being the Secretary (Mr. C. W. Braine), the Engineer (Mr. H. O. Carr), and other members of the staff of the Gas Company.

The death occurred at Liverpool last Tuesday, in his 69th year, of Mr. JOHN SHIRESS WILL, K.C., whose name is well known to most of our readers from its association with that of the late Mr. W. H. Michael in the production of their joint work on "The Law Relating to Gas and Water Supply." After Mr. Michael's death, the third edition was edited by Mr. M. J. Michael, and Mr. Shiress Will edited the subsequent editions alone. In the fourth, which was brought out in 1894, he included the Electric Lighting Acts of 1882, 1888, and 1890, and the Board of Trade Rules and Regulations. These, however, were subsequently published in a separate volume. The fifth edition of the original work was published in the year 1901. Mr. Shiress Will was a native of Forfarshire. He entered for the Bar at the Middle Temple, and was called in 1864. He practised for a number of years at the Parliamentary Bar, from which he retired in 1885, when he stood as a Liberal for the Montrose district burghs, and was returned by a large majority. He easily retained the seat at the succeeding General Elections of 1886, 1892, and 1895. At the election in the last-named year, however, Mr. John Morley (now Lord Morley of Blackburn) was defeated at Newcastle-on-Tyne; and Mr. Shiress Will accepted the Chiltern Hundreds, and made way for him. He then quietly resumed the practice of his profession, and was retained in a number of important compensation cases under the Lands Clauses Consolidation Act and rating appeals. In 1906 he obtained his appointment as County Court Judge of Circuit No. 7.

Personal.

On the recommendation of the Gas Committee, the Bingley Urban District Council have decided to temporarily fill the vacancy shortly to be created by the resignation of their Gas Engineer and Manager, Mr. H. Smith, by the appointment of one of the present employees in the Gas Department, Mr. JULIAN STEPHENSON, junr., to take charge of the works, with a salary at the rate of £125 a year.

Electrolysis of Reinforced Concrete.—The possibility of electrolytic action corroding steel embedded in concrete has suggested many experiments, during one of which three specimens were made by embedding 2-inch tube to a depth of 8 inches in the concrete. Two of the specimens were placed in water, and a steady current of 0·1 ampere was passed through them from a storage battery—the current entering through the tube, and leaving through the concrete; while the third specimen was not subjected to current, in order that a comparison might be made. The current was maintained continuously for thirty days, and it was found that unexpected deterioration of the concrete took place, large cracks appearing in it, while a layer of rust formed on the tubes, and pitting was very noticeable with an appreciable loss in weight. Some other tests made were on 1½-inch tube buried to a depth of 9 inches in a 1 :3 :5 concrete, and a current of 0·05 ampere was passed through and continued for seventy days. The electrolytic action was found to be very strong, and the softening of the concrete very marked. While specimens not subjected to current remained clean and bright, the others developed a coating of rust, the thickness of which increased with the duration of the flow of current, and a coating of rust was also developed on the walls of the cracks.

INSTITUTION OF GAS ENGINEERS.

Programme of the Annual Meeting.

The Programme of the Annual General Meeting of the Institution of Gas Engineers, which, as already announced, is to be held at the Institution of Mechanical Engineers, Storey's Gate, St. James's Park, from the 14th to the 16th prox., under the presidency of Mr. James W. Helps, the Engineer and General Manager of the Croydon Gas Company, has been issued by the Secretary (Mr. Walter T. Dunn).

The proceedings on the first day will be opened at 10.30 a.m. with the passing of a resolution on the occasion of the death of His Majesty King Edward the Seventh; and then will follow the submission of the minutes for confirmation, the appointment of Scrutineers, and the presentation of the Council's report (given below), with the accounts, and also the medals awarded for papers read last year. Mr. Helps will next deliver his Inaugural Address, and the reading and discussion of papers and communications will be commenced. The following is a list of them:—

Report of the Carbonization Research Committee.
Report of the Gas-Heating Research Committee.
Report of the Refractory Materials Research Committee.
"Public Lighting from a Municipal Point of View," by Mr. Jacques Abady, of London.
"Experiments in Carbonization on the Birmingham Coal-Test Plant," by William B. Davidson, D.Sc.
"Gas as a Universal Fuel," by Mr. H. L. Doherty, of New York.
"Gas Calorimetry in the United States," by Mr. J. B. Klumpp, of Philadelphia (Penn.).
"The Latest Installation of De Brouwer Stoking Machinery and Coke-Handling Plant," by Mr. S. Y. Shoubridge, of Lower Sydenham.
"The Management of Small Gas Undertakings and Works," by Mr. F. J. Ward, of Knowle.

On Tuesday afternoon, there will be a meeting of the Joint Commercial Sections of the United Kingdom, to which all members of the Institution are invited. On Wednesday morning, the annual general meeting of the donors and subscribers to the Benevolent Fund will be held, at which the report of the Committee of Management for 1909-10 will be presented, together with the accounts for the year ended Dec. 31, 1909, two members of the Committee will be elected to succeed those retiring by rotation, and other business connected with the fund will be disposed of. On Thursday, the remaining papers will be taken, and the usual concluding business transacted.

As already announced, in consequence of the national mourning, there will be no reception and dance by the President and Mrs. Helps at the Galleries of the Royal Institute of Painters in Water Colours, Piccadilly, on the evening of the first day of the meeting; but they will entertain the members at tea on Friday afternoon, at the Japan-British Exhibition. In the morning, a visit will be paid to the Croydon Gas-Works, at the close of which the members will be invited to partake of luncheon by the Chairman and Directors of the Gas Company. Arrangements will be made for the subsequent conveyance of the party to the Exhibition; and after tea the evening will be at their disposal.

Annual Report of the Council.

Before proceeding with the annual report, the Council desire to express their profound sorrow for the loss which not only this country but the whole civilized world has sustained by the death of His late Majesty, King Edward the Seventh. A resolution of respectful sympathy with the Queen Mother and the other members of the Royal Family and of loyalty to King George V. will be submitted for the adoption of the members at the forthcoming meeting of the Institution.

Membership.—As will be seen from the statement below, the total membership at the close of the year 1909 was 829—an increase of four as compared with the previous year. The additions to the register comprised one honorary member, seventeen members, eight associate members, one associate, and seven students.

Class of Member.	At Dec. 31, 1908.	Elected and Transferred during 1909.	Deceased, Transferred, and Erased during 1909.	At Dec. 31, 1909.	Increase.
Honorary members	22	1	..	23	1
Members	693	17	19	691	−2
Associate members	94	8	7	95	1
Associates	1	1	..	2	1
Students	15	7	4	18	3
Totals	825	34	30	829	4

The Council regret that since the presentation of their last report the deaths of the following members have occurred:—

Honorary Member.

Emile Leclerc	Paris

Members.

Samuel James Acland	Newport, Mon.
John Henry Cox	Sunderland
Charles A. Craven	Dewsbury
George Cutler	Stroud
George Keyte	Workington
Edward Lord	Whitworth
John Marsland	Sowerby Bridge
John Meiklejohn	Yorktown, Surrey
D. C. Niven	Glasgow
Robert Sharpe	Belfast
Francis William Torpey	St. Ives
William A. M'Intosh Valon	London
George Wilson	Middlesbrough

Livesey Memorial Fund.—It was announced in the Council's last report that this fund, opened with the object of perpetuating the memory of the late Sir George Livesey, by the establishment of a Professorship of Coal Gas and Fuel Industries at the Leeds University, had reached the amount of £9793 1s. 7d.—the minimum required being £10,000. Since then it has been increased to £10,820 1s. 11d., made up as follows:—

No. of Subscribers.				
14	Institution, District Associations, and Junior District Associations	£342	1	6
228	Members of the Institution of Gas Engineers	946	10	7
160	Gas companies	7,102	3	0
24	Gas committees of corporations	540	16	0
55	Members of the Society of British Gas Industries	538	1	0
29	Other manufacturers, coal owners, &c.	308	13	0
95	Other subscribers	745	3	6
605		£10,523	8	7
	Interest on deposit account	98	11	2
	Interest on current account (by special arrangement with bank)	198	2	2
		£10,820	1	11

A meeting of the subscribers was held in the hall of the Institution of Mechanical Engineers, kindly lent for the purpose, on the 18th of May, at which the final arrangements were made for the establishment of the professorship. The management of the department endowed by the fund will be in the hands of an Advisory Committee, consisting of representatives of the University of Leeds, the Institution of Gas Engineers, and the Society of British Gas Industries, under the general control of the University Council. A Deed of Gift has been prepared by the Institution's Solicitors, and submitted to the University for approval.

Portrait of Sir George Livesey.—The portrait of the late Sir George Livesey, subscribed for by the members of the Institution, and painted by Mr. Edward March, now adorns the Council-room. It has been universally admired as a faithful likeness and fine work of art.

Annual General Meeting.—The annual general meeting of the Institution (the forty-sixth since its establishment in 1863 as the British Association of Gas Managers) was held at the hall of the Institution of Mechanical Engineers, Westminster, kindly lent by the Council of that body, on Tuesday, Wednesday, and Thursday, June 15, 16, and 17, under the presidency of Mr. Thomas Glover, of Norwich. The following communications were read and discussed:—

Report of the Carbonizing Committee.
Report of the Gas-Heating Research Committee and Explanatory Note by the Chemist to the Committee, Mr. E. W. Smith, M.Sc., of Leeds.
"Carbonizing," by Mr. J. Ferguson Bell, of Derby.
"Illuminating Efficiencies of Carbon Monoxide and Hydrogen used in Conjunction with Incandescent Mantles," by Mr. Arthur Forshaw, M.Sc., Institution Fellow, of Leeds.
"A Study in Working Costs," by Mr. Herbert Lees, of Hexham.
"Carbonization in Chamber Settings," by Dr. Rudolf Lessing, of London.
"Relative Capital Accounts of Gas Undertakings Owned by Companies and Local Authorities," by Mr. Arthur Valon, of London.
"Some Advantages and Disadvantages of a Hot-Coke Conveyor," by Mr. Robert Watson, of Doncaster.

The three medals which are offered annually in connection with the papers read have been awarded by the Council as follows: The London Gold Medal to Mr. J. Ferguson Bell, for his paper on "Carbonizing;" the Institution Silver Medal to Dr. Rudolf Lessing, for his contribution on "Carbonization in Chamber Settings;" and the Institution Bronze Medal to Mr. Robert Watson, for his communication on "Some Advantages and Disadvantages of a Hot-Coke Conveyor."

A reception and dance were given by the President and Mrs. Glover on Tuesday, the 15th of June, at the Galleries of the Royal Institute of Painters in Water Colours, and were greatly enjoyed by the large number of members and friends who attended.

On Friday, the 18th of June, an excursion was made to Norwich and the works of the British Gaslight Company visited, through the courtesy of the Chairman and Directors, by whom the party were generously entertained at luncheon. The afternoon's programme, including a visit to the famous Broads and an inspection of the Cathedral, was kindly provided by members and officers of the Norwich Corporation.

Affiliation.—During the year another District Association—the Wales and Monmouthshire District Institution of Gas Engineers

and Managers—has become affiliated with the Institution, bringing the number of affiliated Associations to eight.

The representation of the District Associations on the Council for the year 1909-10 was as follows:—

Eastern Counties Association. . .	Mr. C. F. Ruggles.
Irish Association	Mr. T. Frizelle.
Manchester District Institution . .	Mr. W. Whatmough.
Midland Association	Mr. W. Langford.
North British Association. . . .	Mr. W. Blair.
North of England Association . .	Mr. W. Ford.
Southern District Association . .	Mr. James Paterson.
Wales and Monmouthshire District Institution	Mr. T. Canning.

Examinations in "Gas Engineering" and "Gas Supply," 1910.—Mr. W. Doig Gibb having resigned the position of Examiner in "Gas Engineering," the Council were invited by the Technological Committee of the City and Guilds of London Institute to nominate a successor. Mr. Thomas Glover, Immediate Past-President, was accordingly approached, and he kindly consented to accept the post, and was duly appointed by the Committee. With reference to his first examination, which was held on the 16th of April last, Mr. Glover reports that 304 candidates presented themselves; 106 taking the Honours, and 198 the Ordinary paper, compared with 311 last year (116 Honours and 195 Ordinary). Mr. J. H. Brearley, the Examiner in "Gas Supply," reports that there were 303 candidates examined in that subject on the 23rd of April last, comprising 93 in the Honours and 217 in the Ordinary Grade, against 315 last year (80 Honours and 235 Ordinary).

Gas Standard Burner.—With further reference to the statement in the Council's last report in regard to efforts which were being made for introducing a Bill into Parliament to prescribe a standard burner (the "Metropolitan" argand No. 2) to be used throughout the United Kingdom for the official testing of the illuminating power of gas, the Council note with satisfaction that the Gas Companies (Standard Burner), (No. 1), (No. 2), and (No. 3), Bills, which were promoted by the Gas Companies' Protection Association, have passed the House of Lords, and await the second reading in the House of Commons on the re-assembling of Parliament. These Bills, if passed into law, will be an important step in the direction of unification of the testing standard, which is so greatly desired by the gas industry.

Accounts of Local Authorities.—The Council have had their attention drawn to the action of the Institute of Municipal Treasurers and Accountants in appointing a Committee to consider regulations for financial organization and administration, the effect of which, if adopted, would be to place the financial control of every department, whether trading or non-trading, in the hands of the Finance Committee and the Financial Comptroller, who would override the powers now exercised by the other committees and chief officers of the various departments. Believing that the adoption of such proposals would be detrimental to the interests of the gas departments concerned, the Council directed that a circular should be issued to the members of the Institution, expressing the hope that they would use every effort to strenuously oppose the movement suggested. The Municipal Tramways Association, who are taking a leading part in the opposition, report that a Sub-Committee has been appointed to endeavour to obtain an interview with the President of the Local Government Board on the subject in question.

Income-Tax and Depreciation.—The attention of the Council has also been directed to a circular issued by the Board of Inland Revenue, with regard to the allowance of income-tax in respect of depreciation of gas undertakings. They referred the matter to the Parliamentary Committee, who, in considering it, were kindly assisted by Mr. W. A. Schultz, F.C.A., whose knowledge and experience they found of great advantage.

In support of the view that an allowance should be made from the profits assessable under Schedule D, in respect of depreciation for wear and tear of plant and machinery, the Committee report:

The Income-Tax Act, 1842 (5 & 6 Vict., Cap. 35), Section 60, Schedule A, Rule No. 3, provides—

> "The annual value of all the properties hereinafter described shall be understood to be the full amount for one year, or the average amount for one year, of the profits received therefrom within the respective times herein limited."

The properties are described in the third sub-section, which includes "Gas-Works." Gas-works are therefore assessed under Schedule A, Rule 3.

The Revenue Act, 1866 (29 & 30 Vict., cap. 36, sec. 8), provides—

> "The several and respective concerns described in No. 3 of Schedule A of the said Act (above quoted) passed in the 5th and 6th years of Her Majesty's reign, chap. 35 (A), shall be charged and assessed to the duties hereby granted in the manner in the said No. 3 mentioned (the preceding one year's profit), according to the rules prescribed by Schedule D of the said Act, so far as such rules are consistent with the said No. 3."

This in effect transfers the assessment from Schedule A to Schedule D.

The allowance of depreciation is made obligatory in the Customs and Inland Revenue Act, 1878 (39 & 40 Vict., cap. 16), Part 2, Taxes, Section 12, which provides—

> "Notwithstanding any provision to the contrary in any Act relating to income-tax (A), the Commissioners for general or special purposes shall, in assessing the profits or gains of any trade, manufacture, adventure, or concern in the nature of trade chargeable under Schedule D (*b*) or the profits of any concern chargeable by reference to the rules of tha schedul (*c*), allow such deduction as they may think just and reasonable as representing the diminished value, by reason of wear and tear during the year, of any machinery or plant used for the purposes of the concern, and belonging to the person or company by whom the concern is carried on," &c.

The principle of allowance for depreciation is re-affirmed in the Finance Act, 1907, 7 Edw. 7, cap. 13, section 26, which provides—

> "(1) For the purpose of enabling deductions for wear and tear to be allowed by the additional Commissioners, claims in respect of those deductions shall be included in the annual statement required to be delivered under the Income-Tax Acts of the profits or gains of the concern for the purpose of which the machinery or plant is used, and the additional Commissioners in assessing those profits and gains shall make such allowances in respect of those claims as they think just and reasonable."
>
> "(4) In this section the expression 'deduction for wear and tear' means the deduction allowed, or which would be allowed under section 12 of the Customs and Inland Revenue Act, 1878, as representing the diminished value, by reason of wear and tear during the year of machinery or plant used for the purposes of any trade, manufacture, adventure or concern."

In cases of claim for depreciation, the two last-named Acts may be relied on—viz.: The Customs and Inland Revenue Act, 1878, and the Finance Act, 1907, which both explicitly state that the Commissioners shall allow such deduction as they may think just and reasonable, and that therefore they have only to decide what amount is just and reasonable.

Commercial Sections.—The Council having considered the suggestion of the Commercial Section of the Southern District Association, that steps should be taken for the systematic advertising of the advantages of the use of gas, recommend that this and other questions should be discussed at a conference of all the Commercial Sections to take place in the afternoon of the first day of the Institution's meeting; and arrangements for carrying this into effect have been made accordingly with Mr. S. Meunier as Convener and Mr. H. Kendrick as Hon. Secretary. All members of the Institution are invited to this conference, at which a report of the Joint Commercial Sections of the United Kingdom will be submitted.

Visit of the German Association of Gas and Water Engineers.—Arrangements for a visit of the members of the German Association of Gas and Water Engineers for the week ending the 28th of May, in response to the invitation addressed to them by the Institution, were being made, and were in fact practically completed, when the lamented death of King Edward occurred, in consequence of which, and at the suggestion of the German Association, who sent a kind message of sympathy and condolence, it was decided to postpone the visit until the autumn.

Société Technique de l'Industrie du Gaz en France.—A similar message expressing the deep sympathy and condolence of the Société Technique de l'Industrie du Gaz en France on the death of the King was received from the President of that Society.

The Special Purposes Fund.

The important work which is being conducted by means of the Special Purposes Fund was continued during the past year; and valuable results were obtained. The Council regret to observe that only 103 undertakings are represented in the list of contributions to the fund. They would ask members connected with those undertakings not subscribing to bring the claims of the fund before their Committees or Boards of Directors, so that their assistance may be given to the work which, carried out for the benefit of the whole industry, should be supported more adequately.

Carbonization.—The Sub-Committee having in hand the investigation of the various methods of carbonization—Messrs. Charles Carpenter (Chairman), Edward Allen, J. Ferguson Bell, A. E. Broadberry, Thomas Glover, W. Langford, John. W. Morrison, Alexander Wilson, and S. Y. Shoubridge (Hon. Secretary)—report that they have been disappointed in their endeavours to arrange for a comparative test, made as far as possible under identical conditions, of the three best-known systems of vertical retorts, difficulties having arisen which necessitated the abandonment of the project. One of the members of the Committee has, however, furnished the details of an investigation into the working of horizontal retorts with full charges; and this communication will, it is thought, form a valuable supplement to the paper he contributed last year to the Institution's proceedings. The particulars of this investigation will be presented at the forthcoming meeting of the Institution.

Gas for Heating Purposes.—The investigation into the hygiene and economical application of gas for heating purposes has been continued in the Department of Fuel and Metallurgy of the Leeds University, under the direction of the Sub-Committee, consisting of Messrs. John Bond, J. H. Brearley, and Charles Wood, with whom Professors Smithells, William A. Bone, and Julius B. Cohen have kindly co-operated as representing the University; Mr. E. W. Smith, M.Sc., acting as Chemist to the Committee. The report of the Committee, which is now being completed for presentation at the forthcoming meeting of the Institution, will contain the following sections: (1) Condensing stoves; (2) radiation efficiencies of various types of stoves; (3) variation in radiation efficiencies due to changes in the gas consumption; (4) change in the method of determining radiant heat used during the past year; (5) proposed simplification of the method of determining the radiant heat; (6) increase or decrease of the radiation efficiency due to varying the composition and shape of the fire-clay "fuels" employed in the stove, together with a short report on a few minor

points; (8) general considerations with regard to the hygienic aspects of gas-stoves.

Gas Research Fellowship.—Mr. Arthur Forshaw, M.Sc., the first holder in 1907 of the Institution's Fellowship at Leeds University, and who was appointed for a second year, gave the results of his work carried out under the direction of Professor Bone in the Fuel and Metallurgical Laboratory, in the form of a paper entitled "Illuminating Efficiencies of Carbon Monoxide and Hydrogen Used in Conjunction with Incandescent Mantles," which was read and discussed at the Institution's meeting last year. The University Senate, on the recommendation of the Board of Science and Technology, have appointed Mr. Harold Hartley, M.Sc., to the Fellowship for the year 1909-10; and he is now engaged, under Professor Bone, on an investigation relating to surface combustion, and especially to the supposed connection between the electrical condition of a hot surface and its power of inducing gaseous combustion.

Refractory Materials.—The Refractory Materials Committee, consisting of Messrs. James W. Helps (President), E. Allen, John Bond, A. E. Broadberry, H. G. Colman, W. Doig Gibb, Thomas Glover, Thomas Goulden, D. H. Helps, W. R. Herring, Edward Jones, James Paterson, S. Y. Shoubridge, Alex. Wilson, Harold W. Woodall, and F. J. Bywater (Hon. Secretary), report as follows:—

For the purpose of obtaining definite information with regard to the life of the material now used, and the temperatures at which it is employed, inquiry forms have been sent to a number of representative works. The opinion of engineers has also been invited as to the desirability of drawing up standard specifications for different kinds of refractory material, on the question of an independent testing laboratory, &c. Very useful information has been obtained as a result of the inquiry, and conferences are now being held with representatives of the retort and fire-brick manufacturers through the Society of British Gas Industries, to see how far the requirements of the industry can be met. The Committee hope to be able to present a full report dealing with the whole matter before the time arrives for making contracts for next season's requirements.

Unification of Gas-Threads.—The President and Mr. Thomas Glover represented the Institution at the second session of the International Commission appointed by the Société Technique de l'Industrie du Gaz en France to deal with the "Unification of Pipe-Threads," to which reference was made in the Council's last report. The report of the proceedings of this second session was given by Mr. Helps at the close of the Institution's annual meeting last year.* Mr. Glover desiring to relinquish his position as representative of the Institution, the Council have accepted his resignation with regret, and have pleasure in reporting that Dr. R. T. Glazebrook has kindly consented to act in his place. The third session of the Commission is expected to be held in Paris later in the year.

JAMES W. HELPS, *President.*
WALTER T. DUNN, *Secretary.*

May 27, 1910.

[Appended to the report is a list of the additions made to the library during the year, for which the Council express their thanks; also the statement of accounts and balance-sheet for the year ended Dec. 31, 1909, duly certified by the Auditors, Mr. James L. Chapman and Messrs. Wood, Drew, and Co., and a list of contributions to the Special Purposes Fund.]

Report of the Benevolent Fund Committee.

The Committee report that during the year ended Dec. 31, 1909, the amount of £264 14s. 9d. was received. Subscriptions produced £143 2s.; donations, £11 13s.; interest on investments, £105 0s. 1d.; and income-tax refunded, £4 19s. 8d. The expenditure amounted to £284 2s. 10d.; £255 10s. having been granted in the relief of twelve necessitous cases, and £28 12s. 10d. expended for printing and stationery, postages, bank charges, and incidental expenses. There was thus a deficit of £19 8s. 1d., in consequence of which the Committee were unable to deal with all the applications for assistance received at the close of the year. They would therefore again appeal to the members who do not subscribe to the fund, in the hope that they will kindly become contributors, and thereby enable the Committee to grant adequate relief to every applicant whom they consider eligible. With the object of increasing interest in the fund, alterations in the rules have been made, whereby the Honorary Secretaries of the District Associations affiliated with the Institution have been added to the Committee of Management, and providing also for nominations by contributors for service on the Committee.

[The list of contributors for the past year and copy of accounts, duly certified by the appointed Auditors, Mr. James L. Chapman and Messrs. Wood, Drew, and Co., are appended to the report.]

* The Council give the text of the report, which appeared in the "JOURNAL," for June 22, 1909, p. 885.

Masonic.—The installation of Bro. John Mackay as W.M. of the Northern Star Lodge, No. 3053, was duly carried out last Friday at Manchester. It may be remembered that, in consequence of the severe illness of Bro. Mackay, this ceremony, which should have taken place last February, had to be postponed; but as a very material improvement has taken place in his health, he was able to attend last week, and was installed by W. Bro. Surtees, I.P.M.

CAUSES OF DESTRUCTION OF REFRACTORY BLOCKS AND RETORTS.

By ALFRED B. SEARLE, Ph.D.

(*Concluded from p.* 494.)

RESISTANCE TO BLOWS.

AN important characteristic of almost all fire-clay products is their resistance to accidental damage by blows from either material or from the tools used by the workmen. There is not usually much difficulty in selecting goods which are reasonably strong in this respect; and the provision of a special test for the purpose is scarcely needed. If the goods are satisfactory in all other respects, they will scarcely fail in this. It is, however, important to notice that "hardness" is often recommended as a characteristic in favour of retorts and blocks—chiefly with a view to suggesting that they will, for this reason, resist blows of various kinds. This, is, of course, true; but excessive hardness is often synonymous with brittleness, and is almost invariably accompanied by density, and consequently by a low resistance to sudden changes in temperature. Hence, the wise engineer will usually pay less attention to the resistance of these materials to blows than to their other characteristics; for even in the worst cases, fire-clay is by no means a weak material as far as abrasion is concerned.

CRUSHING STRENGTH.

What is far more important is the ability of the retorts, and especially blocks and bricks, to resist the pressures to which they are subjected in daily use. Unfortunately, it is very difficult to set any minimum strength in this respect; for the behaviour of a clay at high temperatures is so widely different from what would be assumed from the results of an ordinary crushing test, and the difficulties in the way of carrying out a crushing test at a temperature of 2000° Fahr. are very great. The present writer has, on several occasions, built bars of the same material as the blocks into a special furnace and has heated these in a manner as nearly as possible like that used in heating ordinary gas-retorts; the bars being loaded with fire-bricks placed on their centres until the breaking point was reached. Owing to the great loads required where the material is suitable, this test can only be regarded as of value when sorting out undesirable materials, and then only those of the weakest kind. Rough as it is, however, the test has served to demonstrate the great loss in strength which occurs when fire-clay products are heated to redness or to still higher temperatures, which are still far below the temperature at which they begin to lose shape. The author has also attempted to test the strength of various retort and block mixtures by placing them in a retort-setting and firing them in the absence of a retort, but with a vertical bar (properly protected with fire-clay) resting on them—pressure being applied to this bar by means of powerful chains attached to a cross beam resting on the top of it. The tension on the chains was caused by loaded waggons; suitable pulleys being employed, so as to avoid the necessity of a load directly over the furnace. This method is, however, too clumsy for general use, though it served to show why some blocks failed in actual use. The ordinary brick-crushing testing machine is too delicate an appliance to be used in testing the strength of materials at the high temperatures required, and some modification of it which could be used for this purpose would be a blessing to many gas engineers. As at present carried out, the crushing test on fire-bricks and retorts is practically useless, and can never be relied upon to give any indication of their strength in actual service.

At present, the most suitable means of securing that the articles are sufficiently strong is to insist that they shall be fired in the manufacturer's kilns to a temperature of not less than 2500° Fahr. (2600° Fahr. being preferable), and that the same material when heated to the point of incipient fusion shall not be appreciably diminished in porosity until it has begun to lose its shape. The latter test is a very delicate one, and requires considerable skill in its execution, as it is not usually practicable to heat samples of more than 1 oz. in weight to the high temperatures required, and consequently the variations in porosity are always small—only "trifling" errors in measurement causing large errors in the final result.

DESTRUCTIVE AGENCIES IN THE FUEL.

The defects and causes of failure hitherto mentioned have been chiefly concerned with the fire-clay products themselves. It is, however, often found that the damage or shortness of "life" is due to adventitious materials in the fuel used for heating the furnace or for making gas. Thus the contact of ashes with fire-clay at a high temperature will always cause a certain amount of fluxing, and will therefore weaken the work wherever such contact takes place. It is most marked in the flues where the fine dust, rich in alkalies, is blown with some force against the hot work and corrodes it partly by its own natural cutting action (abrasion), and partly by its chemical combination with the silica of the clay. Where such action is at all violent, bricks rich in alumina should be used, or those which are particularly hard-fired may be employed if the action of the dust is more abrasive than chemical.

Sulphur in the fuel burns to sulphur dioxide; and in the presence of air and steam this is converted into sulphuric acid,

which has a highly corrosive action upon clay goods. To some extent, the sulphur may be prevented from volatilizing by mixing slaked lime with the coal; but this, for obvious reasons, is seldom practised. It is extremely unwise to generalize on the results of a limited number of experiments—the more so as both pure clay and silica are, when treated separately in a burned state, unaffected by sulphuric acid to any appreciable extent. At the same time, the results of many of the present writer's observations tend to show that the richer a fire-clay is in alumina, the greater will be its resistance to the products of the sulphur in the fuel. The presence of sulphur inside the retorts is of less importance than in the furnace, as in the retorts the lower temperature reached and the absence of air prevent any serious quantity of sulphuric acid being formed in a free state.

Wet fuel is far more serious than sulphur, as superheated steam has a strong softening effect on fire-clay work, especially when the latter is porous. The proportion of moisture in ordinary coal is not sufficient to do much harm, so far as the furnace is concerned; and the carbonaceous lining of the retort after a short time of use protects the latter from serious damage. So that, unless the fuel is abnormally damp, no special precautions need be taken. A careful study of the fire-bricks used in boilers having a steam jet in the fire-box to increase the draught, will soon show the effect of heating fire-clay in presence of an excess of steam. This effect is so seldom noticed in the manufacture of gas as to be scarcely worth the attention of the gas engineer; though the fact that, under certain conditions, steam may seriously affect the durability of the retorts and brickwork should be kept in mind.

The internal strains set up in retorts when used for gas-making, and in other cases where carbon is absorbed within the pores of the material, have not been sufficiently studied to render any publication of definite results satisfactory. It is, however, well known that when heavy hydrocarbons are decomposed in fire-clay, leaving much of their carbon behind, some very noticeable changes in the strength of the fire-clay body take place, though the exact nature of the reactions remains unknown. In some ways, the action appears to be catalytic, and to be due to the fire-clay itself, as the same hydrocarbons when heated under precisely similar conditions in the absence of fire-clay require a higher temperature for the formation of free carbon, though the experiments hitherto made are by no means conclusive on the point.

The action of this deposited carbon is seldom seriously detrimental, and is often advantageous, as it fills up small cracks in the retorts, and so enables them to be used for a much longer time than would otherwise be the case. If the deposit is so thick as to be a serious hindrance to the heating of the retort (carbon being a bad conductor of heat), it may be scraped off periodically, or the retorts may be made very smooth inside by the manufacturer. In some cases, they are even covered with a thin layer of glaze; the claim being made that this facilitates the drawing and heating. Whatever action such glaze may have must be very small; and the repeated heating and cooling of the retort will soon make it break up. Its value will thus rapidly diminish. It is, therefore, questionable whether it is worth the extra expense, even though this is only small.

Crystallization.

Much attention has recently been paid to the crystallization which occurs when clays are repeatedly heated and are cooled slowly. Mr. J. W. Mellor has studied this matter as fully as anyone in this country, and his work has been confirmed in many directions by other observers—notably by a lengthy investigation on china clay by a Continental worker. It is essential that the heating shall be prolonged or frequently repeated and that the cooling during the earlier stages shall be sufficiently slow for crystals of appreciable size to be formed. This phenomenon is not often observed in the case of gas-retorts, though it may be readily seen if microscope slides are prepared from suitable parts of old retorts—particularly the thicker portions, where the cooling is slower. In some instances, however, it has proved important as an explanation of failure; and on this account it should not be overlooked when investigating the causes of destruction. The amount of crystallized matter is naturally greatest when the clay is rich in fluxes, though this is not invariably the case, as some of the alkaline ingredients of a clay are always volatilized at high temperatures.

Conclusion.

In conclusion, the present writer has avoided what may be considered as the mechanical causes of destruction apart from those of a more strictly chemical or physico-chemical nature; and for this reason he has made no reference to the right construction of settings, the best shapes of retorts, the objections to certain patterns of retort now in use, the method of firing, the rate of heating, and the mode of drawing the coke. These are all matters which have received much attention from gas engineers, and though the problems in connection with them are by no means solved, what is of greater moment at the present time is that attention should be paid to the actual texture and structure of retorts and blocks used, as these are of far greater importance than many gas engineers and fire-clay workers are aware, it is safe to assume.

The Gas Institution's action in endeavouring to work co-operatively with the manufacturers is a step in the right direction; but far more thorough work will have to be done in investigating the problems if the truth is to be reached. At present, there is too much reliance placed on rule-of-thumb specifications; and the records of many "tests" made by gas engineers are too scanty to be of much service.

Continental manufacturers, subsidized by their Governments in various ways, have done so much in the way of preliminary investigations, and several firms in this country have, on their own initiative, done so much more, that the main lines of work in improving the quality of British retorts and blocks may be considered as definitely known. In this country, however, much of these improvements are regarded as "trade secrets," and there is still a large amount of indifference on the part of even well-known firms to enter upon any general or co-operative scheme for the improvement of their products, though they refrain from undertaking this work individually because of the probable cost. Yet everyone admits that any improvements would be a great benefit to all the industries concerned, and that by making them much of the present anxiety with regard to the importation of foreign retorts could be stopped.

When manufacturers and gas engineers unite in declaring that improvements are both desirable and possible, only one comment is possible—they must endeavour to obtain them separately as individuals or they must press for more vigorous efforts on the part of the joint body appointed for this purpose.

PURCHASING LIGHT.

During the past few years, endeavours have been made to educate the public up to an appreciation of the advisability of keeping before them the idea of purchasing light rather than the agent for its production; and the following remarks bearing on the subject appeared in a recent number of the "Illuminating Engineer" of New York.

The substitution of the magnetite arc for the enclosed carbon arc is one of the factors in this education. The increase in illumination is so material and evident to the ordinary observer that the public are quite willing to pay a larger price for current when used with this light source. After all is said and done, it is illumination that is wanted; and the only safe course for the central station to take is to educate the public along these lines as rapidly as can be done without encountering an undue amount of prejudice and opposition.

The most efficient electric lamps of to-day are great improvements, in point of economy of current, over those which they are supplanting; but they are a long way from being the limit of perfection in this respect. There is no telling when another lamp may make its appearance representing an equal advantage in economy. It is a self-evident proposition that another improvement over the best modern lamps equivalent to that of these lamps over their predecessors would bring about the positive necessity for central stations receiving a higher rate per kilowatt for current for lighting purposes. There is no need of expatiating upon the difficulties of raising prices; the present howl about the increased cost of living is sufficient proof. No matter what the conditions or circumstances may be that bring about an increase of price, those who must pay will object. The only sure way to avoid such objections in the case of light is for the public to get accustomed to paying for the thing which they really buy—viz., light. Then when any further improvement in its production is made, the cost can be reduced to a certain extent, and still leave a portion of the benefits to the producers.

Means of measuring illumination have been brought to a sufficient state of perfection to form a basis for cost; and it only remains for the users of light to be made familiar with the fundamental principles of illuminating engineering. Such a condition would not only obviate the serious question of the reduction in current occasioned by improvements in lamps, but would ensure a much better understanding between consumer and producer, and in the end conduce to equity and justice to both.

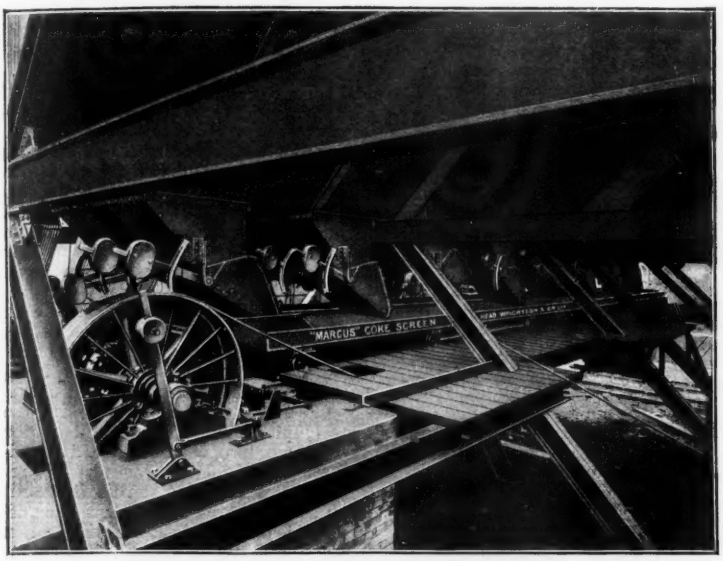
A Spacious Gas-Lighted Armoury.

The last number of the "American Gaslight Journal" to hand contains an illustration of the spacious armoury at Scranton (Pa.), which has been entirely fitted up for gas lighting by the Hyde Park Gas Company of that city. The drill hall, which is 120 ft. by 240 ft., is provided with sixty gas-lamps, each containing four mantles, and fitted with light opalescent globes. They are 15 feet above the floor and about 22 feet apart. The galleries, halls, and various quarters are lighted with either gas "arcs" or inverted mantle burners. According to some particulars furnished to our contemporary by Mr. E. M. Stack, of the Scranton Gas and Electric Company, the entire armoury is equipped to the extent of 60,000-candle power; and though electric current is supplied at from 2 c. to 10 c. per kilowatt in Scranton, the officials find that they get 60 per cent. more light from gas at 40 c. per 1000 cubic feet, and, moreover, have an uninterrupted and uniform service. The fittings have been designed to harmonize with the elegant and artistic decorations and furniture of the building; and the result is that the drill hall, in which many of the leading social functions of the city are held, is the most effectively lighted room in any large edifice in the State.

NEW COKE PLANT AT CROYDON GAS-WORKS.

The "Marcus" Screening-Conveyor.

When the members of the Institution of Gas Engineers visit the Croydon Gas Company's works on the Friday of the week of their annual meeting, they will find much there to arrest their interest. During the past few years, to meet the ever-increasing requirements of Croydon and the neighbouring districts, to supersede that which was uneconomical by that which is economical, and to realize other advantages, reconstruction and extension work has been, almost unceasingly, in progress, until now a point has been reached at which there may be a pause for a space. It will be seen that the President of the Institution (Mr. James W. Helps) has, with his engineering staff, had a busy, but interesting, period during the execution of all this necessary change; and it will likewise be found that, into what has been done, there has been original introduction in design and system. The latest addition to the works is a new coke-handling plant in connection with one of the retort-houses, in which plant there has been incorporated (we believe for the first time in gas-works) the Marcus screening-conveyor of Messrs. Head, Wrightson, and Co., of Thornaby-on-Tees; the other important members of the installation being the work of West's Gas Improvement Company. The whole installation was carried out to the designs of Mr. Helps, and under his supervision.



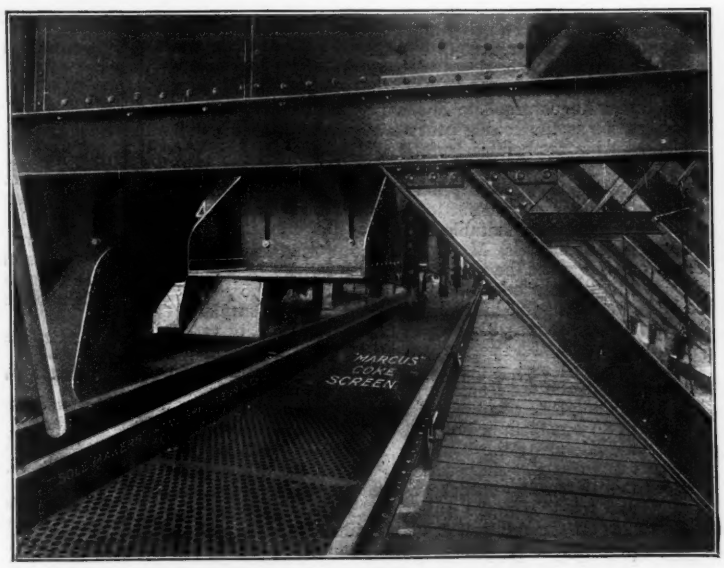
The "Marcus" Coke-Screening Conveyor.

We will briefly describe the plant in the order of its operation. The coke is taken from one side of the retort-house by a West hot-coke conveyor, 206 ft. long by 2 ft. 9 in. wide, driven by a 9 brake horse power motor. Quenching the hot coke is done by means of jets of water delivered at a pressure of 60 lbs. per square inch, supplied by a two-stage centrifugal Tan-Gyro 17 brake horse power motor driven pump. The water and the fine breeze find their way through the screen over which the coke passes on its journey to the shoots by which the coke-skips are filled. The water and fine breeze fall into underground settling-tanks, where the breeze settles out—the water overflowing into another compartment, whence it is again pumped for further use. The coke-conveyor motor, and also the motor-driven pumps, are housed in a small building over the underground settling-tanks.

Turning now to the coke storage, screening, and loading plant. Over this is constructed a crane-gantry, with an extension on either side, carried upon which is a high-speed electric crane made by Messrs. Stothert and Pitt of the free-barrel three-motor type, with a 30 brake horse power lifting motor, 11 brake horse power travelling motor, and 4 brake horse power slewing motor—the respective speeds being: Lifting, 160 feet per minute; travelling, 160 feet; and slewing, 340 feet. The crane will deal with a skip of coke from three retorts, holding approximately 1 ton. While one skip is being dealt with by the crane the other skip is being filled by the conveyor and automatic shoot. The range of capability is excellent. The crane can deposit the coke in any part of the hopper; or, by travelling across the top, it can put the coke into the yard on the far side. The coke-hopper has a length of 58 ft. by 40 ft. wide, is 41 ft. to the top, and has a storage capacity of approximately 500 tons of unscreened coke. At one end of the hopper, are small hoppers for broken coke and breeze. The whole of the broken coke required is made by passing through two "Cort's" coke-cutting machines, each with a capacity of 8 tons per hour, and driven by an 11 brake horse power motor—the small coke passing over fixed round bar screens to the hopper on either side, and the breeze into the hopper between the two. Shoots are arranged to deliver the small coke, &c., into railway trucks or carts as required. Small hoppers are fixed above the breakers, and are capable of holding one skip of coke each.

This brings us to what will be regarded as the chief feature of novelty in the installation—the two Marcus screening-conveyors (63 ft. long by 3 ft. 6 in. wide) by Messrs. Head, Wrightson, and Co., which conveyors deal with the coke deposited in the main hopper. The coke is fed on to the conveyors by a series of balanced hinged shoots along the bottom of the hopper, the angle of which can be altered to adjust the flow. The purpose of these conveyors is to load the railway trucks with screened coke direct, and they have a capacity of 30 tons per hour each. The coke as it travels along the conveyors passes over perforated bottom plates, about 10 ft. long, fixed in each conveyor, which separates out the breeze. The conveyors are driven by the patent Marcus gear, which imparts a uniform acceleration to the forward movement, and a uniform retardation to the return movement. The speed is between 72 and 80 strokes per minute. The conveyors are mounted on spring-controlled rollers, and the driving gear upon a solid concrete foundation. The motive power is supplied by a 12 brake horse power motor. On the yard side of the hoppers are a series of fixed round bar screens, with baffles, down which the coke falls for loading into carts direct; the breeze passing through the screen into the space under the hoppers.

Here we have described the whole plant in outline in the order of consecutive operation. But before concluding, it may be added that the construction of the Marcus conveyor is very simple. The trough may be made to any section, and can be fitted with perforated bottom or otherwise according to the purpose to which it is proposed to put it. The trough is supported on line rollers,



and receives a peculiar to-and-fro motion from the patent driving mechanism. The material is rapidly conveyed along the trough only on the forward motion. The propulsion gear is so constructed that, by means of cranks and a connecting link, a variable speed is produced. As the trough increases in speed, it gradually imparts sufficient impetus to overcome the frictional contact between the material and the trough on its backward stroke. The advantage of this in the case of coke will be obvious. There is nothing about the travel of the coke in this conveyor that is comparable to the jigging-conveyor. In the Marcus form, there is not the same oscillatory movement as in the case of the latter; the travel, while rapid, being forward only, and remarkably free from vibration.

The prospectus of the Smoke Abatement Exhibition which is being organized by the Glasgow Corporation for three weeks in September and October next has been issued. It will be held in the Victoria Skating Rink.

HORIZONTAL CHAMBER SETTINGS.

In preceding numbers of the "Journal," reference was made to two articles by M. Grebel, in recent issues of "Le Génie Civil," on the evolution of furnaces, for the production of illuminating gas, with special reference to the utilization of horizontal carbonizing chambers for the purpose. In the second article he deals specially with the economics of the question.

M. Grebel points out that the horizontal chamber setting possesses naturally the advantages which are common to all similar furnaces—viz., economy of labour and high yield of gas. These and other characteristics he proceeds to consider in succession. Dealing first with labour, he gives the following as the number of working hours or "men-days" necessary in a retort-house with different systems of furnaces: Ordinary horizontal retorts, 12; ditto with mechanical stoking, 6; inclined retorts (30°), 5·5; vertical retorts, 2; chamber settings, 1. He acknowledges, however, that it is difficult to make exact comparisons, as the percentage of labour may vary with the organization of the works, the size of the gangs, and the greater or less efficiency of the arrangements for the supply of coal and the removal of coke. He thinks that the 30 tons of coal per eight hours per man, which has been talked about, is a limit that could scarcely be reached, even with very large 7-ton installations of chamber settings. At Padua, to serve four of these settings, 20 feet in length, nine men are employed in three gangs—one of five and two of two each to supervise (though one would have been amply sufficient)—instead of the 65 men who were engaged on the former furnaces. With regard to the "life" of the setting, M. Grebel considers that this must necessarily be longer than with ordinary retorts, on account of the slight wear and tear owing to the large space available for discharging. He points out that the Rotterdam chambers have been working uninterruptedly for nearly two years without showing signs of deformation or wear. A constructor who guarantees his horizontal chambers of simple and strong construction for 600 to 800 days, will not give his inclined chambers more than 400 to 600 days. These minimum figures will, however, apparently soon be surpassed in practice, and the actual life of these settings approximate that of coke-ovens—at all events, be much longer than that of ordinary retort-settings. In regard to yield of gas, Herr Klönne's firm guarantees 1200 cubic feet per 220 lbs. of good dry gas coal containing not more than 10 per cent. of ash. If brought to the basis of chamber length, the daily production per metre (3·28 feet) run is at least 7400 cubic feet. The guaranteed illuminating power of the gas is 13 Hefner units, or close upon 12 English candles; the gas being tested with a "Metropolitan" burner No. 2 at standard temperature and pressure. The yield of gas per metric ton during a trial was 12,116 cubic feet; the heating power being 1,901,857 calories; whereas with ordinary retort-settings similar coal only produced 1,738,205 calories per ton in the same time. This difference was maintained in trials extending from August, 1908, to February, 1909. The quality of the gas decreases as the coking process advances; the gas given off in the last six hours being inferior to the other. But, as pointed out by M. Sissingh, at the meeting of Dutch gas managers early last year, all that is necessary is to mix with this gas the rich gas produced in the first six hours' carbonization in another chamber to obtain a product of suitable quality.

Coming to residuals, M. Grebel shows that the coke from chamber settings has the appearance and density of metallurgic coke, and that it is produced at the rate of about 76·7 kilos. per 100 kilos. of coal, or 72·6 kilos. in its dry condition. The yield of tar at Rotterdam is about 5·8 litres per 100 kilos. of coal, or 13 gallons to the metric ton. Its specific gravity is 1·09. It contains little naphthalene, and 2·54 per cent. of free carbon, compared with 14 per cent. in the tar from the ordinary retorts on the works. The yield of sulphate of ammonia is 11 kilos. per metric ton, compared with 8 kilos. from ordinary retorts, or an increase of 35 per cent.; indeed, during the trials, as much as 13·36 kilos. of sulphate per ton of coal were produced.*

M. Grebel thinks it would be a great mistake to suppose, as people have tried to make out, that the new systems of gas-furnaces permit the realization of considerable economy in the total working expenses. The most that can be hoped for, in his opinion, is that the sinking fund payments, the interest on the money spent on the installation, and the expenses of maintenance and for motive power, may be largely compensated for by the reduction in the cost of labour, which is the real advantage attending these new settings. At the same time it must be borne in mind that they occupy less space than an ordinary setting of retorts. Reckoned on the basis of daily carbonizing capacity, the area occupied by a setting 6 metres long is only 1·8 square metres per ton; but with the 9·5 metre type this figure is reduced to 1·6 square metres. The space before the setting to allow for discharging is practically the same as that reserved in front of 20-feet through retorts for the charging and drawing machines. Consequently, horizontal chamber settings may often be installed in existing retort-houses.

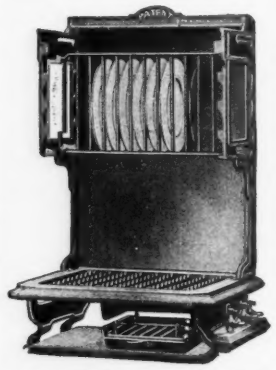
The author next offers some observations on the experiments carried out with horizontal chamber settings at Padua. They continued from Jan. 26 to Feb. 2 last, with fourteen four-ton chambers; and the results are tabulated. The total production of gas (corrected) was 129,848 cubic metres, or rather more than 4½ million cubic feet, of gas, or at the rate of 1325 cubic metres (46,770 cubic feet) per chamber per 24 hours. Of the coke used for heating purposes, allowance has to be made for that required for evaporating the moisture in the coal. On this being done, the quantity works out to about 14 per cent. of the total weight of coal.

M. Grebel concludes his long and interesting articles by remarking that just as, notwithstanding all that has happened, there remain independent electricity stations, so there will subsist a number of small and of medium-sized gas-works using the old system of retort-settings. Nor will recuperative coke-ovens, heated by gas, altogether disappear. But he appears to regard it as possible that we shall some day see coke-ovens in operation without recovery of their bye-products.

* A full account of the trial referred to was given in the "Journal" for Dec. 29, 1908 (p. 902).—Ed. J.G.L.

COOKER PLATE-RACKS.

These are good times for the numberless people who are wise enough to adopt the use of gas for cooking purposes; for their comfort and their convenience are ever being studied by the manufacturers of culinary appliances. Well to the fore in this respect, it need hardly be remarked, are the Parkinson Stove Company, Limited, whose latest list of gas-cooking apparatus indicates that they have been devoting attention to an important point in the serving of a hot meal—namely, the warming of the plates and dishes. The accompanying illustration shows their enamelled back plate with an improved patent plate-rack introduced by the firm. The back plate, which is enamelled white, and can be easily cleaned, prevents the kitchen walls being splashed during cooking operations. The rack on which the plates and dishes are placed for warming can be used in five positions in height, as necessity requires; and it can be drawn out (in a manner similar to the self-locking grid-shelves which are a well-known feature of the Company's ovens) without fear of the crockery being upset. Provision is further made to enable the rack to be used in a perpendicular position, which allows of the more even and thorough warming of plates, &c. It can be fitted, of course, to different sized stoves.



Parkinson's Improved Plate-Rack and Back Plate.

A similar back plate can be had with a more simple and inexpensive plate-rack fitted at the top, so arranged that, when not required, it can be readily lowered out of position against the back plate. Those desiring something unlike either of these arrangements, can be furnished with a cast-iron hot closet (provided with a fall door) attached to a back plate, and standing at a suitable distance above the cooker top. This closet is warmed by means of the waste heat from the oven, so that when a joint is cooked a warm dish and plates are waiting for it without any additional cost in gas consumption having been incurred.

The New Building of the Institution of Civil Engineers.

The Secretary of the Institution of Civil Engineers (Dr. J. H. T. Tudsbery) has recently circulated among members a pamphlet relating to the new building in course of erection, at the corner of Great George Street and Prince's Street, Westminster, which upon completion will be the home of the Institution. It has been designed by Mr. James Miller, F.R.I.B.A., in the style of a modern rendering of the later Renaissance. On the ground floor will be the general offices, reading-rooms, and Council and Committee rooms; a handsome vestibule and hall giving the main access to these. Upon the first floor will be found the great hall, which will be a distinguishing feature of the new building, the lecture theatre, and the chief library. Further library and other accommodation, such as writing and smoking rooms, will be provided on the second floor. An interesting point of construction will be the use of timber and other products selected from all parts of the British Empire, which may be taken to symbolize the wide character and relationship of British engineers the world over.

The Federated Gas-Works in the Potteries.—At the meeting of Potteries Federated Council at Tunstall last Thursday, the Gas Committee reported that they had requested each of the Managers of the several gas undertakings to submit to the Committee a report on the whole of the gas-works in the borough, giving his views as to the most economical method of working, either separately or by coupling-up two or more of the undertakings, and to state in the report his opinion as to the best method of conducting such works, either separately or jointly. The report was adopted.

ILLUMINATING ENGINEERING SOCIETY.

Annual General Meeting.

The Annual General Meeting of the Society was held on Monday evening last week, at the Royal Society of Arts. Professor SILVANUS P. THOMPSON, D.Sc., F.R.S., the President, occupied the chair, and at the outset of the proceedings made reference to the loss the country has sustained by the death of King Edward VII.

The HON. SECRETARY (Mr. Leon Gaster) then read the report of the Council, which marked the termination of the work of the first session of the Society. An abstract of the report appeared in last week's issue of the "JOURNAL" (p. 502). In addition to the particulars then given, the following statement of the Council with regard to the character of the membership of the Society may be quoted: "The distribution of members is proportionally as follows, though naturally this can only be regarded as a very approximate classification: Electrical engineers and members concerned mainly with electric lighting, 39 per cent.; gas engineers, manufacturers of gas appliances, &c., 18 per cent.; professors of physics, experts in photometry, &c., 10 per cent.; representatives of oil, acetylene, petrol air gas lighting, &c., 8 per cent.; physicians, oculists, opticians, &c., 8 per cent.; architects, surveyors, &c., 3 per cent.; and miscellaneous, including makers of shades and reflectors, mechanical engineers, and others not exclusively connected with any one system of lighting, 14 per cent."

The PRESIDENT said they had listened to the report of the Council summarizing the work of the year. It was unnecessary to labour the points set forth; but there were two matters on which he thought it might be worth while to lay a little emphasis. The first was the extraordinary degree in which they had succeeded in enlisting the co-operation of foreign correspondents. Contributions to their various discussions had been received from both Europe and America. It was clear that they did not stand alone in this country, but received the support of those in other countries who were best qualified to speak upon the matters within the ken of the Society. He understood that their Honorary Secretary had been seeing some of those people who might have been able, had they been minded, to form another Association in Paris; but they were of opinion that they could not do better then join the English Society, and so they would continue to receive contributions to their discussions from their French friends. He thought the same might be said of Germany, Belgium, and elsewhere. The Americans, of course, had their own Illuminating Engineering Society; but they were taking a keen interest in what was being done here. The second matter to which he wished to refer was the statement in the report that the Editing and Papers Committee were now "arranging for the regular contribution of papers by individual readers upon selected topics." They were going to follow up the policy in the forthcoming session of devoting the monthly meetings to subjects which they thought would be of value to the wider circle of members who were not limited in interest to purely technical matters. It was contemplated that papers on such questions as the lighting of streets, shops, libraries, schools, &c., would be presented; and in this way the Council hoped they would succeed in enlisting the co-operation of some who had not as yet recognized the importance of the Society. He referred specially to surveyors and architects, who were an extremely important technical class. It was, he feared, because they had not realized how much they had to learn on this subject, that they had not come forward in large numbers to see what could be learnt. Those who had been working on the question for some years had been finding out all the winter how little they knew; and it was to be hoped that those who had not discovered how much knowledge there was to be gained would give the Society their support.

Mr. J. G. CLARK remarked that he did not think anyone would say, after hearing the report, that there was not a great work before the Society, both in importance and extent. Personally, he entertained the highest hopes with regard to the future; and he had pleasure in moving the adoption of the report.

Dr. R. LESSING seconded the proposition, which was at once unanimously agreed to.

The PRESIDENT pointed out that the Council elected last session were, by the rules, to remain in office for three years—it being the commencement of a new Society. When this period had elapsed, a new Council or fresh members would be appointed each year. But even during the first three years, the rules provided that there should be each year certain new members chosen by the Council. The following had been so selected, and had accepted office: Dr. W. Eccles, Mr. A. Stokes, the Chief Outdoor Inspector of the South Metropolitan Gas Company, and Mr. A. H. Seabrook. These three gentlemen represented three entirely different branches of the Society's membership—the medical and surgical profession, the gas interests, and the electrical supply industry. Then Mr. Denman Jones and Mr. V. H. Mackinney had consented to act as Hon. Auditors, though, of course, there were as yet no accounts to present.

On the motion of Mr. R. J. WALLIS-JONES, seconded by Dr. W. LEVY, it was agreed—"That the first sentence of Article 8 in the constitution of the Society, which at present reads: 'The President shall hold office for one year only, but shall, after the lapse of a year, be eligible for re-election,' shall be modified as follows: 'The President shall hold office for one year, and shall then be eligible for re-election; but his period of office shall not exceed three successive years.'"

Proposed by Mr. T. HAYDN HARRISON, and seconded by Mr. W. OKEY, it was also decided—"That Article 25 in the constitution of the Society, relating to the payment of subscriptions, should be modified as follows: 'Subscriptions shall be dated quarterly, becoming due in the quarter of the year in which the member joined the Society.'"

Mr. WALLIS-JONES, in proposing a hearty vote of thanks to Professor Silvanus Thompson, remarked that the success which had attended the first session of the Society was very largely due to the fact that they had had such an excellent President. It was to his international reputation that they were indebted for having secured so great a measure of support from scientific men abroad. The Council had acted wisely in suggesting the alteration of the constitution, as it would enable them to retain the benefit of Professor Thompson's services as President for a further period of twelve months.

The vote having been seconded by Mr. F. J. COX, and heartily accorded,

The PRESIDENT, in acknowledgment, said that in occupying the chair another year, he could not undertake to give the same amount of time or thought as he did last autumn to the preparation of a Presidential Address; but the Council had assured him that it would not be necessary to produce another work of such elaboration.

The other officers were also heartily thanked for their services; a compliment which was acknowledged by Mr. GASTER.

This concluded the formal business of the meeting; and the members then had introduced to them some new photometrical apparatus. There were two instruments; and both were of portable type. The first, designed by Mr. Haydn Harrison, was in the form of a long narrow box, with a scaled screen on which the readings are taken by merely placing the appliance in the light. The second, introduced by Mr. J. S. Dow, was quite a pocket apparatus, fitted with an eye-piece through which the observations are made.

Mr. HAYDN HARRISON said he had been trying to think of something that would be the acme of simplicity in the shape of a photometer; and the result was the instrument now submitted to the members—which he did not call a photometer, but an "illuminometer." With it one could walk right round a room or picture gallery, or down a street; and it was not necessary even to stand still before the observer could see what was the illumination at a particular point. Its accuracy would probably be quite as great as was requisite for this kind of work. In the hands of a man used to photometry, it would have the same accuracy as an ordinary photometer; but in those of the people he hoped would, on account of its simplicity, use it—such as architects and surveyors, who had not time to take actual measurements, but to whom a general knowledge of what was going on in buildings or streets was always helpful—it would come within 10 or 15 per cent. It had probably got the longest scale in the smallest space of any photometer; for, though only 14 inches long, it would measure from 100 candle-feet to 0·2 candle-foot. All that was necessary was to look at the instrument.

The PRESIDENT: You have certainly attained great simplicity.

Mr. DOW said his was rather a different idea—namely, to measure, by looking through the eye-piece, the intrinsic brilliancy of the surface one was pointing the instrument at. Taking the apparatus into a school-room, for instance, the observer could get an idea of the actual conditions under which a pupil was working. It was intended for use rather by the man who knew what he was doing, than by one who had no knowledge of such work. One respect in which it was convenient was that very often when an observer might desire to study something, it was impossible to find a place to put a photometer. With his apparatus, one was not much limited by distance. So far as he had tried it, he thought that, within reasonable limits—up to about 10 feet or so—no very material difference would be found. He mentioned that Mr. Mackinney had worked with him throughout in the production of the instrument.

The PRESIDENT said this also was a simple appliance. The two instruments did not solve exactly the same problem; and he thought they would satisfy different requirements.

Mr. JOHN DARCH expressed the opinion that in time to come they would have to rely more and more on reflected light for illumination. He would even, he said, like to see the streets lit in this way. With light walls, they did not want such strong light sources. Therefore they wanted an instrument to give the reflecting power of a wall. In his opinion, this would be the only really useful instrument to an architect.

Mr. F. EDGCOME remarked that this was exactly what Mr. Haydn Harrison's instrument would do.

In the course of the report of the half-yearly meeting of the Portsmouth Water Company which appeared in the "JOURNAL" last week, reference was made to the practical completion of the new filtration works, and to the litigation between the Company and the London, Brighton, and South Coast Railway Company, in which the former were successful. These matters imposed considerable additional work upon the Engineer (Mr. Herbert Ashley, M.Inst.C.E.); and in consideration of this he has been awarded a gratuity of 200 guineas.

CONTROL OF UNIFORM CANDLE POWER.

At the Second Annual Meeting of the Pennsylvania Gas Association, a paper on the above-named subject was submitted by Mr. C. R. STULL. It was based upon communications presented at various times during the past few years—notably by Messrs. Forstall, Gartley, and Blauvelt. The following are the principal portions of the paper.

To thoroughly cover the subject, I believe it is necessary to start on the first step in the manufacture of the gas—viz., the control of the retorts or generator sets. The proper or improper working of these is a decided determining factor on the quality of gas put into the holder for distribution. In this respect, conditions vary with each individual case, as no set rule can be formulated or laid down as regards the proper heat to be employed for the most efficient operation of the retorts or generators. High heats might be desirable with certain coals and oils, which with other kinds would produce most disastrous results. It is the general result, however, that the gas undergoes a greater drop in candle power when produced with low heats. When the heats are higher, there can be obtained a harder or better fixed gas, which can usually be transmitted to greater advantage under both high and low pressure distribution.

The desirable contents in illuminating gas are the high-tension vapours, chief among which is benzene. Along with this we have certain fixed gases, by which I mean those that are stable at ordinary temperatures. A vapour at ordinary temperature exists as such below its critical temperature, and a gas at ordinary temperature exists as such above it. The general composition of the illuminants in the gas depends, in the case of coal gas, on the composition of the coal carbonized and the enriching oil, if this is used. In the case of water gas—it is dependent to a great extent on the oil employed for carburetting. The illuminants which are conserved to the finished gas are now dependent upon the heats to which this raw gas is subjected, and on the method of condensation. Oils containing more members of the paraffin and olefine series require different heats for proper fixing than oils with a benzene base. The more complex members of the paraffin series are broken-down into the lower members, which go to make up the illuminants.

In the case of water-gas practice, I believe the control of the heats should be left partially to the judgment of the gas maker. It is a very common occurrence, particularly in a small works, to find conditions varying to a greater or less extent. For instance, the fire may be in such condition to-day that it turns out more blue gas per run than it did yesterday. Assuming the same length of run, then the carburettor and superheater heats can be higher, as the volume of gas, and hence the speed of travel through the machine, is greater. If, on the contrary, the fire is not working as well, the heats could be lower, as the gas is longer in contact with the chequer bricks, and consequently has more chance of approximating the desired temperature. In speaking of high heats, I mean heats above the average practice. We are now using higher heats than were employed several years ago; and this has been the means of producing increased yields—a very desirable result. With these high heats, however, we have a "cracking process" of the hydrocarbons in the gas, by which some valuable illuminants are formed, and also some undesirable constituents. This, I believe, is the point of formation of most of the naphthalene present—two benzene rings being broken into one naphthalene and one ethylene.

Now, we will assume that the gas has come through the scrubbers and condensers with the maximum amount of desirable gases and vapours in it. Quoting from Mr. Forstall's paper:

Condensation is perfect only when the gas leaves the apparatus carrying such an amount of the most valuable hydrocarbons originally present in it, as it passes out of the retort, as will just fall short of saturating it at the minimum of temperature and maximum of pressure to which it will be subjected during its journey to the burner. The attainment of this perfection of condensation is rendered difficult by the fact that the various hydrocarbons have a solvent action upon each other, which makes it almost impossible to condense out the vapour of any of these, even though its boiling-point be high and its vapour tension low, without at the same time bringing down more or less of these vapours with low boiling-points and high tension, that, if diffused in the gas after the heavy vapours have been removed, would be retained under all conditions of temperature and pressure met with during distribution; while, on the other hand, the lighter vapours hold up at low temperature some of the heavy vapours that but for this mutual action would be condensed out at high temperatures.

Keeping in mind the effect of this solvent action, we can readily understand why it is desirable to remove the condensate from intimate contact with the gas at about the temperature at which it was deposited. One step in the attainment of this result is gradual condensation. When a gas is "shocked," the condensate first forms as a mist; thereby allowing an intimate contact between the full body of gas and its condensate. This will cause a quicker readjustment of the vapour tension still valid, with the result that the condensate will carry down a quantity of desirable high-tension vapours.

As the process of condensation is carried on, the ratio of the high-tension to the low-tension vapours is increasing; but the vapour tension of the composite mixture is gradually decreasing. This statement merely repeats the well-known law that the pressure exerted by a mixture of a gas and a vapour, or of two gases, is equal to the sum of the pressures which each would exert if it occupied the same space alone. A mixture of 50 per cent. of benzene and 50 per cent. of water would exert a pressure equal to the sum of the vapour pressure of the two separate substances at the temperature of the observation. With liquids which mix readily, the pressure of the mixture is approximately the mean of the two individual pressures.

The ideal method of condensation would be one in which the base temperature was such that only the least trace of high-tension vapours could stay in the condensate, while the outlet should be the minimum which the gas would reach at any point in the distribution system. In order to determine this minimum temperature, recourse must be had to the hygrometer, which will quite accurately show the minimum to which the gas has been exposed, provided that between the point of minimum temperature and the hygrometer the gas has not come in contact with any other vapour condensate.

If at some point beyond our photometrical testing-room we can procure gas which has been chilled to a point equal to, or slightly lower than, that which it will reach at any other point in the mains, and can have the candle power at this point up to the standard, we can feel reasonably certain that it will carry to the burners. No further condensation assures no additional loss in candle power. Continuing farther along this line the experimental work with the freezing-coil and hygrometer, the candle power necessary to be carried, in order to pass this point at a predetermined minimum, may be readily ascertained. With uniformity in retort and generator house practice, this rule should hold for all cases in any individual plant.

With regard to benzol enrichment when employed with the view of equalizing variations in illuminating power, a good deal might be said. Practice strongly supports the theory that, in order to secure enrichment, the vapour tension of the enriching liquid must be above the tension of vapours already present in the gas. This was forcibly demonstrated when we endeavoured to enrich carburetted water gas with benzol. With a benzol of 78 per cent. quality, we were unable to obtain any enrichment; in some cases it proved negative. This oil gave satisfactory results on coke-oven gas of low candle power; carrying well throughout both the low and the high pressure districts. During the colder months, the quality of benzol used was above 86 per cent.; it being found that this was necessary in order to deliver a gas of standard candle power. Along with proper condensation, better carrying properties could be obtained if the gas were washed before enrichment with an oil capable of absorbing the low-tension vapours, leaving behind only the high-tension vapours.

During the past two years, my own experience has been almost entirely with benzol enrichment. It has been on varying ratios of water gas and coke-oven gas, which, coupled with variable weather conditions, at times presented some peculiar problems. In the early spring, we experienced a condition, for weeks at a time, when it was not necessary to introduce any enriching oil into the coke-oven gas. This gas reaches our station at about 5-candle power, and will pick up light oils enough from the holder to enrich it to 17·5-candle power, above which it will not go, but will repeat the operation for a considerable period of time. Of course, the reverse operation is experienced later in the year. This gas carries well on low-pressure, but not so well on high-pressure, distribution; re-enrichment being necessary. By comparing the enriching values and drip-oil tests in the following table, it can easily be seen that the candle power was due almost wholly to condensable vapours:

Month.	Temperature. Air.	Candle Power of Gas. Water Gas.	Coke-Oven.	Fixed.	Candle-Feet.	Darby. C.P.	Drop.
February	38	20·0	7·6	17·3	18,900	11·7	5·6
March	38	20·2	8·1	16·9	18,900	15·2	1·7*
April	50	19·0	7·0	16·8	34,100	16·1	0·7†
May	61	20·1	8·0	16·8	52,500	16·1	0·7
June	71	20·8	6·5	19·0	27,600	15·2	3·8‡
July	74	19·8	6·5	19·0	30,100	17·1	1·9

* Less water gas than in February; better grade of light oil.
† Less water gas than in March. Note increase in air temperature.
‡ Excess of water gas over coke-oven gas.

High-Pressure Drip Oil Test.

	February.	August.
Up to 202°	36·5 per cent.	0·6 per cent.
202° to 212°	60·0 ,,	4·0 ,,
212° ,, 260°	93·0 ,,	41·5 ,,
260° ,, 302°	97·0 ,,	70·0 ,,

The heating values were as follows: Water gas, 619 B.Th.U.; coke-oven gas, 575 B.Th.U.; mixed gas, 603 B.Th.U.

The Midland Association of Gas Managers will hold their spring general meeting on Thursday of this week at Smethwick, on the invitation of the Corporation Gas Committee. After being received at the Council House by the Mayor (Alderman W. H. Goodyear, J.P.), the Chairman and members of the Gas Committee, and the President of the Association (Mr. Vincent Hughes, the Gas Engineer to the Corporation), vehicles will convey the visitors to the gas-works, which will be inspected under the guidance of the President and his assistants. Lunch at the invitation of the Mayor will be followed by a drive to Warley Park and Abbey and a visit to the works of Messrs. W. & T. Avery. The Chairman of the Gas Committee (Alderman C. W. Pinkney, J.P.) will afterwards entertain the members at tea.

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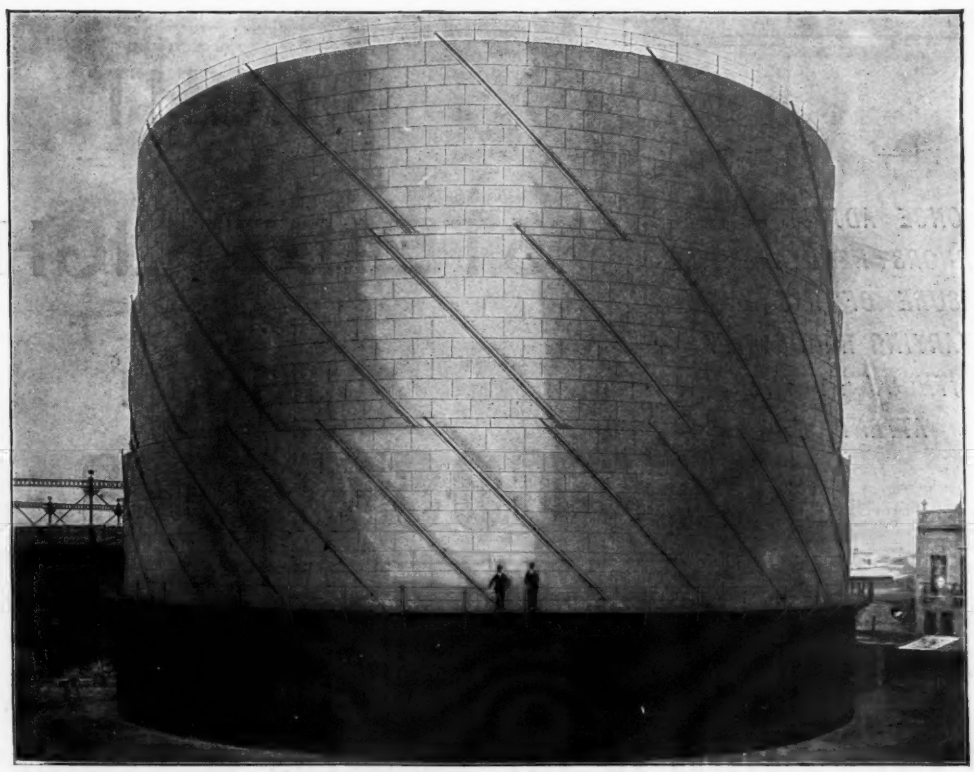

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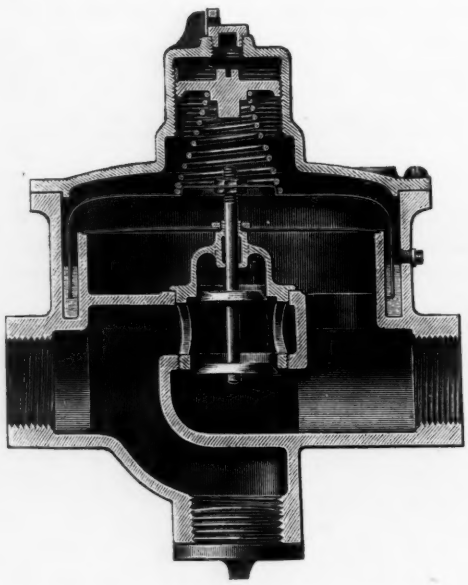

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MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.

Quarterly Meeting at Burnley.

The One Hundred and Fifty-Seventh Quarterly Meeting of the Manchester District Institution of Gas Engineers was held at Burnley on Saturday. The programme included a visit to the gas-works of the Burnley Corporation, chiefly for an inspection of the Woodall-Duckham system of vertical retorts which have been installed there, and are now at work. The party numbered about ninety.

On arriving at the gas-works, the party assembled in the laboratory, and were welcomed by Alderman H. Emmott, J.P., the Chairman of the Gas Committee of the Corporation, Mr. J. W. Clough, the Vice-Chairman, and Mr. J. Petty Leather, the Engineer and Manager. Then a move was made to the retort-house for an inspection of the installation of vertical retorts; most of the time being spent in this part of the works. Mr. Duckham and Mr. Leather, with their assistants, explained the working of the plant to those seeking information in regard to it. Opportunity was also taken by many to view the new coal-stores and the coal-handling plant installed there by the West Gas Improvement Company; also the inclined retorts, the carburetted water-gas plant, the exhausters, and the sulphate of ammonia plant. Subsequently the party assembled at Brunswick Schools, opposite the Town Hall, where luncheon was partaken of, on the invitation of Alderman Emmott and Mr. Clough.

The Business Meeting.

The Business Meeting was held in the same building—Mr. H. KENDRICK (Stretford) presiding.

THE DEATH OF THE KING.

Before the business was proceeded with, the PRESIDENT said it was impossible for a body of Englishmen to meet under any circumstances just now without reference being made to the cloud which rests upon the country by reason of the death of the King. It was not his intention to enter into a panegyric of his late Majesty, even if he were capable of it; but this he would say—that the name of Edward the Peacemaker would be remembered and revered as long as British history lasted. The Committee, anticipating the wish of the members, sent the following resolution to King George V.: "His Majesty the King, Buckingham Palace—The Manchester Institution of Gas Engineers, gratefully recognizing the advantages enjoyed under the glorious rule of King Edward VII. of glorious memory, humbly tender through me, the President, to your Most Excellent Majesty, our profound sympathy with you and the Royal Family; and our earnest hope is that you may happily be long spared to your people to carry on the rule so wisely exercised by your revered predecessor.—H. Kendrick." To this message they had received a reply as follows: "H. Kendrick, Gas-Works, Stretford—The King thanks the Manchester Institution of Gas Engineers for kind message of sympathy and their loyal assurances."

SYMPATHY WITH THE HON. SECRETARY.

The PRESIDENT said there was another matter he desired to refer to before they proceeded. Their Secretary, as some of them knew, had, owing to illness, been away from home for a long time. They were glad to see him back among them again. He (Mr. Kendrick) was certain he was expressing the wish of them all when he said they hoped Mr. Whatmough would have a happy and speedy recovery to health. (Applause.)

Mr. WHATMOUGH thanked the President and the members for their kindly interest, sympathy, and wishes on his return to the secretaryship.

THE OCTOBER MEETING.—STRETFORD'S INVITATION.

After the minutes of the previous meeting had been confirmed and letters of apology read from gentlemen unable to attend that day,

The PRESIDENT announced that he had been empowered by his Directors to extend an invitation to the members of the Institution to visit Stretford on the occasion of their next meeting, which would be in October. He assured them that if the Committee thought fit to accept the invitation, they would receive a hearty welcome from his Directors.

PROGRESSIVE BURNLEY.

Mr. J. W. MORRISON (Sheffield), in moving a vote of thanks to the Chairman and members of the Burnley Gas Committee for having invited the Institution to hold their meeting in Burnley that day, said Mr. Leather must feel highly honoured in having a Chairman and Committee who took such an interest in the progress of the gas undertaking and put down the installation of vertical retorts they had inspected that day. The visit had been a most instructive one to many of them. The installation they had seen certainly did credit to the firm who had erected the retorts. They all sincerely hoped that the installation would turn out a success, and that the Gas Committee and Mr. Leather would reap a full reward for their progressive enterprise.

Mr. T. BANBURY BALL (Rochdale), in seconding the vote, said the visit to Burnley was of peculiar interest to him, because of the decision arrived at by the Rochdale Corporation with regard to the erection of vertical retorts. Mr. Leather and himself were, he believed, early competitors in the race for the installation of inclined retorts. This time Mr. Leather had the start of him in the matter of verticals, and had adopted the Woodall-Duckham system; while they in Rochdale had decided upon the Glover-West system. Therefore Mr. Leather and he would be able before long to compare notes; and it would be interesting to see which of them was best satisfied with his bargain. He was sure they all hoped and trusted that the installation which the Burnley Gas Committee had been so enterprising to first start would turn out everything they desired. It had been of considerable interest to members of the Institution to see an installation of such size in actual work and producing the bulk of the gas required by the town; and he was sure they would all be gratified to hear that the hopes of the Gas Committee and of Mr. Leather had been realized to the full.

The PRESIDENT, in putting the resolution to the meeting, said the Institution was deeply grateful to the Chairman of the Burnley Gas Committee and his colleagues for the opportunity afforded the members of visiting the works to see their fine installation.

The motion having been carried with applause,

Alderman EMMOTT, in responding, said it was a pleasure to him and the members of his Committee to have the opportunity of welcoming to Burnley the members of the Institution. They considered the visit an honour to their Engineer and Manager (Mr. Leather), and also to the town of Burnley, particularly at the present time. The members of the Gas Committee, he frankly admitted, were not experts in gas making; but he did say they were a Committee of business men. They had Mr. Leather as the expert—a gentleman in whom the Committee had every confidence. They had also Mr. Raymond Ross, the Works Chemist and Borough Analyst; and the two were working together in such a way that the Gas Committee had every reason to be satisfied with what was being done. With regard to Burnley being one of the first towns to put down an installation of vertical retorts, Alderman Emmott reminded his hearers that Burnley was also one of the first to go in for the inclined system; and they were put down at a time when there was some doubt about their working satisfactorily. Burnley had no reason to regret their action in installing the inclined retorts, for they had worked very satisfactorily; and they expected the verticals would do the same. When Messrs. Woodall and Duckham had finished their work, the Gas Committee had every confidence that, with Mr. Leather at the head, they would make the new installation a thorough success. Alderman Emmott went on to say that when the question of putting down this installation of vertical retorts was first of all brought before the Town Council of Burnley, it met with some opposition. Members of the Gas Committee pointed out to the Council the advantages of these retorts, and Mr. Leather put the matter in such a way as to convince them as business men that it was the right thing to do. Now they had had the verticals at work for a month or two; but he did not think they were quite up to perfection just yet. Still, he was satisfied that before long every corporation and gas company in the country would go in for verticals. The Burnley installation was expected to be of benefit to the men and to the ratepayers. There was one thing they expected from the system—an improvement in regard to smoke, steam, and draught. The difficulty his Committee had in the Council was that, by putting down these retorts, they would do away with a certain amount of labour at the works—a point that the Labour members on the Council made a great deal of. Having got over this opposition, they expected, as a Gas Committee, being able to show before long that what they had done was justified. He (Alderman Emmott) hoped the members of the Institution had benefited by their visit to Burnley, which, he incidentally mentioned, was the largest cotton manufacturing centre in the world, and also had the largest loom-making industry in the world. The gas undertaking of the town, he added, had been a thorough success since it was taken over by the Local Authority some sixty years ago. They had handed over in relief of rates out of the profits more than their debt stood at the present time; and they had gas at 2s. 3d. per 1000 cubic feet, less 5 per cent. Another thing Burnley prided itself upon in its gas undertaking was that they worked as cheaply as any gas-works in the country, which was a matter of great satisfaction to him and his Committee.

APPEAL FOR THE GAS INSTITUTION BENEVOLENT FUND.

The PRESIDENT, in calling attention to a circular which members had received as to the Benevolent Fund of the Institution of Gas Engineers, said an appeal was made to them about three years ago, and the suggestion put forward that an effort be made to obtain 100 subscribers to the fund from the Manchester Institution. They actually succeeded in obtaining 61 subscribers to the fund, which was doing a really useful work—one that was capable of extension, and the need for which he thought was admitted by all. It was impossible to carry on the work of the Benevolent Fund Committee as it ought to be without money; and an appeal was now made for more subscribers. He was sure all would agree that the great work done in helping the widows

and families of gas engineers left in needy circumstances was worthy of their generous support. The report which members had received that day showed that the amount of cash subscribed during last year (1909) was £143, and that the payments totalled £255. When they considered that they had only about 160 subscribers out of a total of 862 members of the Gas Institution, he thought they would agree it was a condition of affairs which did not reflect to the credit of the Associations, and a condition which they ought to do their utmost to amend. Mr. Kendrick added that the Manchester Institution had 61 subscribers in 1907, 46 in 1908, and 42 in 1909. The figures for the past year were really better than they looked, because he found that 16 members who subscribed in 1908 did not do so in 1909; while there were 10 new subscribers. Therefore had they retained the old subscribers they would have been about level with the year 1907. The Committee of the Manchester Institution, and Mr. James W. Helps, President of the Institution of Gas Engineers, hoped that every member would do his utmost to place this deserving fund on a much stronger financial basis. "Your Committee," added Mr. Kendrick, "decided that, as we had some £70 surplus funds in hand, we could not do better than make a donation of £10 10s. to the Benevolent Fund, in order to assist in wiping off the deficit. This money has been paid, as it was wanted in London; and I think in doing this we anticipated your wishes in the matter." He moved that the Committee's action in subscribing £10 10s. be approved.

Mr. E. A. HARMAN (Huddersfield) seconded.

Mr. T. DUXBURY (Oldham), supporting, said he was satisfied that if members only knew how the money was distributed and the circumstances of the cases dealt with, they would subscribe more generously to the Benevolent Fund. Every case that came before the Committee was thoroughly investigated by someone in the district from which it came; and he could assure the members that most of the cases dealt with were such as to call for even greater assistance than could be given. The Committee did not ask for large subscriptions; and amounts of 5s. or 10s. would be welcome. He thought the Manchester Institution ought to have 100 subscribers to the fund.

The resolution was then put, and carried *nem. con.*

UNIVERSITY EXTENSION LECTURE SCHEME.

The next item on the *agenda* was the consideration of the position of the Seniors to the Manchester Junior Gas Association and a University Lecture Extension Scheme.

The PRESIDENT explained that there had been several meetings with the Juniors on the subject; and so that the matter might be clearly laid before the present meeting, the Committee had prepared the following report.

Lectures on Gas-Works Subjects at Manchester University.

Your Committee have for some time past been in communication with the Manchester Junior Gas Association, with reference to their proposal to enter into arrangements with the authorities of the Manchester University to establish a course of lectures for the benefit of the gas-works juniors, and all interested in the gas engineering profession.

It is felt that the expense and distance from Leeds precludes the Lancashire juniors from attending the special lectures given there; and if the proposed course be instituted at Manchester, it would be greatly to the advantage of the gas profession in this part of the country. There is no question of rivalry with Leeds in the matter, as it is practically impossible for the vast majority of Lancashire assistants to be absent from their duties for about a day-and-a-half per week in the heart of the busy season, for the purpose of attending the courses that have been arranged during the past few years. A suggestion will be made that it would be advantageous if these special lecture courses (even at Leeds) were held in the late spring or early summer, as it is much more likely that leave of absence could then be obtained for the purpose.

Your Committee have communicated with the Institution of Gas Engineers, before giving a definite offer of help, as they do not desire to seem to be interfering in any way with the Institution's arrangements with the Leeds University. Your Committee have received the approval of the Council to the proposal, couched in very cordial terms, and stating that they wish the movement every success—with the proviso that before taking definite steps to give effect to any scheme, the whole matter shall be submitted to the Institution Council.

The main reasons for the proposed step, in addition to those already stated, are: (1) The need for higher education than at present supplied by the classes at the Technical Schools. (2) The advisability of raising the status of the gas engineer, by providing the possibility of at least a partial University training, and the direct advantage that would accrue to the industry by establishing a direct connection and interests between the Gas Associations and the Universities generally.

The Manchester University professors are willing and anxious to assist, and are prepared to advise the Synod to help financially and provide accommodation and lecturers for any approved scheme.

The general trend of the University authorities, at the present moment, is to collaborate with industry in general. At present the gas industry has connections with only one University, while other industries have special training courses in every modern University in the kingdom.

It has been arranged between the two Associations that there shall be a permanent Lecture Sub-Committee, consisting of three representatives from the Senior and Junior Associations, together with Professors Dixon and Carpenter of the Manchester University; and all lecture courses and names of proposed lecturers will be submitted to, and approved by, the Sub-Committee before being finally arranged.

The proposals are at present the establishment of two courses of lectures—one to be highly technical in character on special subjects of great interest to the gas industry. It is suggested that this course should consist of six lectures on the following subjects: (1) Combustion of gases; (2) theory of the gas-engine; (3) photometry or light standards; (4) carbonization theories; (5) constructional engineering as applied to gas-works; (6) applied chemistry in the gas-works. The lecturers are to be three professors and three from the gas engineering profession. The probable dates will be the first Saturday in the months October to March inclusive. They are to be entirely free and open to all interested in gas engineering matters. The cost, it is anticipated, will be somewhere about £50, which, it is suggested, shall be met by contributions from the University and the Manchester Senior and Junior Associations.

The second series of lectures, which have still to be elaborated, will not entail any expense on the Gas Associations, as it is proposed to make them part of the ordinary University course. The course to consist of sixteen to twenty lectures, given in the evening from 5.30 to 7.30—being partly lectures and partly demonstrative and experimental. The lecturers and subject-matter (which would be both physical and chemical) would be under the control of the Special Joint Committee, and delivered partly by Professors Dixon and Carpenter, and partly by other fully qualified men. The suggested fee for the course is £2 2s.—this to include the provision of all apparatus required.

Your Committee desire your approval of the action they have taken in the matter, and your permission to assist further, both by their influence as your representatives and financially as our funds will allow—provided that all schemes are first submitted to, and approved by, them.

The PRESIDENT added that one other suggestion had been made which did not altogether meet with approval on the part of the Juniors. This suggestion, which came from Professor Dixon himself, was that it should be a qualification for admission to the classes that members hold a full class certificate in gas engineering or a full technological certificate. He thought it was likely the Juniors' Sub-Committee would view such a proposition with favour, but that the others would not. At any rate, this was a question which had not yet been settled—whether such a proposition should be included or eliminated from the scheme.

Mr. T. B. BALL (Rochdale) asked why it was proposed to have one set of lectures free and charge £2 2s. for the other course.

The PRESIDENT said the second part was practically a University course, and there would be some cost for apparatus.

Mr. BALL said his experience was that if one gave something for nothing it was not appreciated very much. He noticed that the first six lectures were to be entirely free, and open to all interested in gas engineering matters. This no doubt was about as wide as they could make it.

The PRESIDENT replied that the representatives of the Seniors had insisted upon it being made as wide as possible. He moved that the action of the Committee in the matter be approved, and that they be empowered to go on with the scheme which would be matured later. As to the second part of the scheme, in regard to the sixteen lectures for a fee of £2 2s., this had not been elaborated yet; and before it could be put into force, it would have to meet with the approval of the Committee of the Institution. Practically, the only thing decided up to the present moment was with reference to the six lectures. He was not able to give them the names of the lecturers, because the sanction of the gentlemen had to be obtained before publication.

Mr. J. C. BELTON (Chester) asked what the cost was to be to the Institution.

THE PRESIDENT said the amount would be somewhere near £15. The Juniors were to provide about a like sum, and the University would contribute £20 or more. The University's contribution would, however, have to receive the sanction of the Synod.

Mr. J. H. CROWTHER (Wallasey) asked if it was not a fact that there were now in connection with the technical classes in Manchester sufficient facilities for young men in the neighbourhood getting the education they required in this direction. He did not anticipate they would get much more by the proposed scheme than by the technical schools through the City and Guilds of London Institute. If it was intended to go beyond this, they would be giving an advantage to the few men in the immediate neighbourhood of Manchester which would not be shared by those in other districts who could not come to the lectures.

Mr. GEORGE NIVEN (Cleckheaton) considered it would be rather costly if they had to subscribe to the Manchester University lectures as well as those at Leeds.

The PRESIDENT said the lectures at Leeds had been arranged entirely by the University authorities there in connection with the Chair of Gas Engineering; and most of them had been held in the winter session. As an example of the difficulties which men on the Manchester side had to contend with in attending the lectures at the Leeds University, involving being present on the evening of one day and next morning, he cited the case of one of his assistants who was anxious to avail himself of the facilities offered. The question was how much time it would take; and it was found that it meant a day-and-a-half per week. His Directors, though willing to grant the assistant time to attend the lectures, felt compelled to come to the decision that they would not be justified in letting him go for one-and-a-half days per week in the busy season. If the lectures had been given in the quieter seasons of the year, no doubt the case would have been different. This was the experience of one of his assistants; and very likely it was that of many more in the Manchester district. Then there was the expense in travelling from the Manchester district to Leeds and staying the night in the latter city. He ventured to

say there were not many juniors or assistants in the Manchester district in a position and prepared out of their small salaries to pay these expenses to attend the lectures at Leeds University. The Juniors of Manchester thought it possible, without in any way interfering with the Leeds University, which served certain Yorkshire towns of which Leeds was the centre, to have a similar course of lectures at the Manchester University, which would serve the needs of the districts of which Manchester was the natural centre. The Committee of the Senior Association evinced a considerable amount of sympathy with the idea; and he thought the members of the Institution might very well give the Committee the power they asked for.

Mr. J. H. BREARLEY (Longwood) thought there was some misapprehension as to the lectures at the Leeds University. Those who had taken part in the discussion seemed to think these lectures arose out of the establishment of the Chair of Gas Engineering at the University. He believed this was not the case; the lectures having been previously arranged entirely by the University of Leeds. He was under the impression that the Committee had not given the mature consideration to the matter they might have done. While being entirely in sympathy with the Manchester Juniors in their desire for education, he would like to ask whether the Committee had thought of the possibility of getting the Gas Committees in Lancashire to pay towards the education of their juniors.

Mr. J. WILKINSON (Halifax) was prepared to support the Committee in what had been done, if they would agree to the insertion of words to the effect that the cost to the Institution should not exceed £15 or £15 15s. He thought it better to have the sum fixed.

The PRESIDENT said the Committee would take care that the funds of the Institution were not unduly interfered with. In reference to the remarks of Mr. Belton, he desired to point out that the lectures arranged for would go far beyond the ordinary course of the technical school in connection with the City and Guilds of London Institute. In reply to Mr. Brearley's remark, he might say the Committee had taken into consideration the question of applying to Gas Committees in the Manchester district, and also to the Gas Companies, for financial assistance. Unfortunately, however, in Manchester and the district the ruling authority in nearly all the gas undertakings were corporations; and while the gas committees might finance such a scheme as the one before them, there were other people behind who were not so broad-minded—he referred more particularly to Elective Auditors and the Labour members. Therefore it seemed to him that gas committees would find considerabe difficulty in getting a subscription to such a scheme sanctioned. Then, again, the number of gas companies in the Manchester district was few, and to ask them to contribute what was required would, in his opinion, be asking a little too much. He had no doubt that the Directors of his Company would be prepared to contribute their share, as would others, if the corporations would contribute.

Mr. T. DUXBURY (Oldham) took it that the Committee were asking the members to sanction what had been done up to the present time. He thought they might approve of what had been done with regard to the six lectures, and leave out for the present the remaining sixteen. The fact of the six lectures arranged for being given on Saturdays was, in his opinion, a great advantage. They were to be delivered by well-known men in the gas engineering world, and he believed the services of these gentlemen were to be free. He did not think it was the intention that these gentlemen should receive a fee for the lectures; but there would, of course, be their travelling expenses. As probably some of them would come from London, there would be expenditure in this direction; and he believed the University authorities were prepared to pay their share, while the Juniors were willing to pay £10 or 15. He thought, as the Juniors were showing a desire to improve their knowledge in gas engineering, they as Seniors ought to go some little way to assist them. He was prepared to second an amendment that the amount should not exceed, say, 15 or 20 guineas. The lectures would be of benefit not only to the Juniors but to the Seniors as well; and being held on Saturday afternoons, men living at a distance could very well attend.

Mr. WILKINSON moved, as an amendment, that the report be received, and that the subscription from the Institution should not exceed £20.

Mr. J. W. MORRISON (Sheffield) seconded the amendment without comment.

Mr. CROWTHER moved, as a further amendment, that the matter be referred back to the Committee for them to prepare a complete statement. He remarked that something had been said about the difficulty assistants in the Manchester district had in attending the lectures at the Leeds University, and also about the expense. This might apply, in regard to the proposed scheme for the Manchester University, to assistants who lived at a distance from that centre. He thought he was entitled to ask if something might not be done for those in the Liverpool district, who were just as badly placed in travelling to Manchester as Manchester men were in getting to Leeds.

Mr. J. E. HALL (Prescot) seconded Mr. Crowther's amendment.

Mr. T. DUXBURY remarked that as the Leeds lectures were held at a very inopportune time, and meant a day-and-a-half for those attending them, it was impossible for students in the Manchester area to take advantage of them. The lectures at the Manchester University would be given on Saturday afternoons; and therefore those desirous of attending would have no difficulty at all. What the Committee asked for now was sanction to the arrangements made for the six lectures, which would be free. As to the other sixteen, and the question of a two-guinea fee, this would come before members again before anything definite was done.

Mr. BREARLEY said he was prepared to agree to what had been done with regard to the six lectures, and suggested that the report should be referred back to the Committee, with the exception of the part relating to the six lectures arranged for.

The PRESIDENT pointed out that the proposal of the Committee really was that the meeting should approve of the arrangements made for the six lectures, and authorize them to assist financially. Mr. Wilkinson's amendment was that the arrangements should be approved, and that the Institution should contribute a sum not exceeding £20; and Mr. Crowther's proposal was that the whole matter should be referred back to the Committee for them to bring forward what he called a complete scheme.

Mr. J. TAYLOR (Mossley) pointed out that the lectures so far at the Manchester University had always been delivered on Saturday afternoons, and had been well attended by members from the Liverpool side. He believed the Liverpool men would attend in larger numbers when these extended facilities for education were open to them.

On a vote being taken, 10 members were declared to be in favour of Mr. Crowther's amendment, and 21 in favour of that submitted by Mr. Wilkinson; while for the Committee's proposal there was no show of hands.

The PRESIDENT humorously remarked that he must vote for it himself, even if he stood alone. He then put Mr. Wilkinson's amendment as a substantive motion; and it was carried *nem. con.*

THE EDUCATION AND AUTHORIZATION OF GAS-FITTERS.

The PRESIDENT next moved the adoption of the following report on the education and authorization of gas-fitters.

Education and Authorization of the Gas-Fitter.

Your Committee have at their last few meetings discussed the vexed question of the relationship of the plumber and gas-fitter with the gas undertakings, and the general neglect of modern gas appliances by the gas-fitters generally. So serious is the position in their opinion, that they think the time has now arrived when there should be some co-operation between the Technical Schools, the Plumbers' Associations, and the various Gas Associations; and, in order to put this on a working footing, they suggest the establishment of special classes at the various Technical Schools throughout the country, where gas fitting and gas appliances, their use, fixing, adjustment, maintenance, and repair can be fully explained to all interested, and instruction given, both theoretical and practical.

To give effect to this, it is desirable that the various Plumbers' and Ironmongers' Associations throughout the country should support the proposal, and call their members' attention to the question, and suggest attendance at the classes—not only of apprentices, but their workmen as well. An examination should be held at the end of the session, and certificates of proficiency granted by the Technical School Committees and the Plumbers' Associations. It has also been suggested that the gas undertakings should in future agree not to authorize any gas-fitter who did not possess such a certificate from the Plumbers' or Ironmongers' Associations, or from the Technical School, as is the practice in plumbing to-day.

If arrangements of this kind can be made between the various authorities, it will raise the status of the gas-fitter, and give him a standing that the present-day tradesman has not. It will be generally admitted that a certificate of authorization from a gas undertaking is a considerable asset to every tradesman it is granted to, and a hall-mark of ability to the general body of consumers; and one granted under such conditions as suggested—backed up by both the Plumbers' and Ironmongers' Associations and the gas undertakings—would be a sure testimonial of fitness and ability, and be valuable not only to the gas-fitter, but to the gas undertaking as well in whose district he carried on his business.

Your Committee finally arranged for the Principals of the Technical Schools at Manchester and Salford to be interviewed, to ascertain if their Committees were willing to establish classes for gas-fitters and others, either separately or as supplementary to the already established classes in plumbing. At the same time, a full statement of our ideas and suggestions were to be forwarded to the Plumbers' and Ironmongers' Association and their co-operation enlisted.

A suggested syllabus was drafted, embodying all the matters and apparatus that an ordinary gas-fitter would be called upon to deal with, and placed before the various authorities as instructed. The deputation was most cordially and sympathetically received at Manchester and Salford, and given every encouragement to push forward with the scheme; and your Committee are pleased to report that there is no doubt that a class under a competent teacher will be started in the autumn at Manchester, while Salford have given a definite pledge and authorized the Principal to make the necessary announcements and arrangements for the proposed course of lectures, and have appointed a Manchester district gas engineer as their first lecturer.

The Executive of the Institute of Plumbers have considered your Committee's communication and referred the matter to the Advisory Committee on Plumbing to the City and Guilds Institute, London. The statement has also been forwarded to the Clerk to the Worshipful Company of Plumbers by the kindness of one of our southern friends, who undertook personally to lay it before him.

Your Committee have considerable hope that all our members will, as far as possible, interest themselves in the question, and assist them in their endeavour to retain and even strengthen our present position by inducing, not only their own maintenance men and fitters to attend the classes, but also (what is much more important) will see the plumbers and gas-fitters in their various areas of supply and impress upon them the absolute necessity of their men attending. It is only by missionary work of this description that we can hope to succeed.

Your Committee considered the advisability of remitting the arrangements and negotiations to the Institution of Gas Engineers, but finally decided that it would be better to try the experiment on a small scale in a confined area first, as it is possible there may be opposition on the part of the plumbers and ironmongers, or an attempt to impose such conditions as would make the scheme valueless. If, as we hope and trust, the venture is a pronounced success, and negotiations ensue with the various Associations already mentioned, your Committee propose to ask the Institution of Gas Engineers and the City and Guilds of London Institute to take up the question, and make the necessary arrangements to establish classes in every large centre. The President of the Institution of Gas Engineers has been kept informed of all that has transpired, and will probably himself make considerable reference to the question at the annual meeting in London next month.

The practice of a few gas undertakings of sending their apprentices to Technical Schools and paying their fees, time, and expenses, can be commended to all for their own and their Committees' consideration. Instead of offering rewards for proficiency, it has been suggested that a small increase in wages for those availing themselves of the privilege, attending the classes regularly, and showing marked ability, would be a great inducement to these young men to gain the necessary knowledge. Such men brought up on the gas-works, if they left the undertaking's employ and commenced business as gas-fitters on their own account, would be an asset to the undertaking in whose district they settled.

Your Committee desire your approval of what has already been done, and your instructions to undertake any negotiations that may be necessary—reporting the result to you at the general meetings from time to time.

Mr. R. Watson (Doncaster), in seconding, observed that they were all very much indebted to Mr. Kendrick for having brought this matter forward in his Presidential Address. They knew the trouble caused by the gas-fitter (so-called), and they recognized the need for some such scheme as that now brought forward for their approval. He was quite certain that if this scheme was carried forward, a very considerable benefit to those who had to do with the distribution of gas from the works would result.

Mr. Crowther asked if a corporation or gas committee would be in a position to stop a gas-fitter if he worked in accordance with their bye-laws.

The President said it would mean that the "authorized" gas-fitter would get most of the business.

Mr. Crowther: But you will have no power over a man if he works in accordance with the bye-laws.

Mr. Belton expressed the opinion that this was a matter that ought to be taken up by the Gas Institution, and an Act of Parliament obtained.

The resolution was then put and carried.

Commercial Sections Recognition.

The President said he was happy to congratulate the members upon the fact that the work of the Commercial Sections would in future have the sanction of the Institution of Gas Engineers. For confirmation of this remark he referred to the following paragraph of the Council's report, the principal portions of which will be found elsewhere in to-day's "Journal."

The Council having considered the suggestion of the Commercial Section of the Southern District Association, that steps should be taken for the systematic advertising of the advantages of the use of gas, recommend that this and other questions should be discussed at a conference of all the Commercial Sections to take place in the afternoon of the first day of the Institution's meeting, and arrangements for carrying this into effect have been made accordingly with Mr. S. Meunier as Convener and Mr. H. Kendrick as Hon. Secretary. All members of the Institution are invited to this conference, at which a report of the Joint Commercial Sections of the United Kingdom will be submitted.

The Woodall-Duckham Vertical Retorts at Burnley.

Mr. J. P. Leather (Burnley) then read a paper on the above subject, which is given in the second column of this page.

Venturi Meters for Measuring Gas.

Mr. J. L. Hodgson read a paper on "Venturi Meters for Measuring Large Volumes of Gases." It will be found on p. 562.

There was really no discussion on Mr. Hodgson's paper, principally on account of the late hour consequent upon the long *agenda* that had to be got through.

Votes of Thanks.

Mr. J. H. Brearley (Longwood) moved a vote of thanks to the readers of the papers; saying that the technical fare of the day had been quite up to the high standard of the Manchester Institution of Gas Engineers.

Mr. J. W. Turner (Mirfield) seconded the motion; expressing regret that, owing to the lengthy nature of the business, the discussion on the last paper had had to be hurried.

The resolution having been carried and responded to, the meeting concluded.

Subsequently the members were entertained at "High Tea" by Alderman Emmott and Councillor Clough in the same building. At the conclusion of the repast,

The President moved a vote of thanks to the hosts. They much appreciated, he said, the excellent arrangements made for the meeting, and the hospitality of Alderman Emmott and the Gas Committee.

The resolution having been carried with acclamation,

Alderman Emmott responded. In the course of his remarks, he said he had been a member of the Gas Committee for fifteen years, and Chairman for twelve years. When he and his Vice Chairman were told that the Manchester Institution of Gas Engineers were to hold their quarterly conference in Burnley, both determined to do what they could to make the visit a success; and he was pleased to find their efforts appreciated.

Councillor Clough also responded, and expressed the hope that the members would go away feeling that the visit to Burnley had been both pleasant and instructive.

Thus ended a very busy day for the Manchester Institution.

BURNLEY GAS-WORKS AND VERTICAL RETORTS.

By J. P. Leather.

[A Paper read before the Manchester District Institution of Gas Engineers, May 28.]

There never was a time of greater unrest in the gas industry. Revolutionary ideas are being promulgated and put into practice in connection with every branch of our work—from the handling of our raw material to the oversight of the finished product at the burner. The engineering, chemical, and commercial sides of gas undertakings each has its importance emphasized. This tendency to revolutionary ideas is especially evident in the very foundation of gas manufacture—the department of carbonizing; and in presenting a few notes on the Burnley Gas-Works, it is of this department I propose chiefly to speak. Other parts of the works do not present very striking features of interest.

The manufacture of gas in Burnley dates back very early in the Nineteenth Century; but the Burnley Gaslight Company was not established until 1823. In that year works were erected on the present site. The first gasholder tank is still in use for the storage of tar, and the stone pillars with girders for supporting the counterbalance weights remain in their original position with the inscription "Burnley Gas Company, 1823."

When the Company first commenced, the gas was supplied at a fixed charge per burner; and at the time the undertaking was transferred to the Burnley Improvement Commissioners (in 1855), there were still two contracts running, one at 25s. and the other at 50s. per burner per annum. The make of gas at that time was 25,915,000 cubic feet per annum. Last year the make was 692,578,000 cubic feet. In 1855, the tar and ammonia were sold for £90; last year these products realized over £7000.

Some idea of the character of the site and the nature of its growth may be gleaned from the fact that, although the present area of the works is only about 7 acres, the ground has been acquired by as many as fifteen different conveyances. This piecemeal acquisition of the land has not tended to simplicity in the arrangement of the plant; and the direction of the flow of gas on the works is a very tortuous one.

About one-third of the gas manufactured is carburetted water gas; and the plant for this purpose is of the Merrifield-Westcott-Pearson type. The distinctive feature of this plant is that the blue-water gas from the generator is conducted through a superheating chamber filled with brick chequer-work before reaching the point where the oil is introduced. The reserve of heat in this chamber enables the gas to be brought into contact with the oil at a determined temperature—thus producing certain and consistent results. In plants in which the oil is introduced to the gas immediately it has left the generator, it is evident that the temperature will be dependent on the condition of the coke in the generator. A further feature of this arrangement is that the gas is ascending and thus counteracts the natural tendency of the oil to descend—making more sure the carrying forward of the whole of the oil. The plant is in duplicate; each section being capable of making one million cubic feet per day. The gas is usually made of a quality of about 21 candles, using a little under 2½ gallons of oil per 1000 cubic feet. In this way, the quality of the gas supplied to the town is brought up to about 17½ candles. The carburetted water gas is mixed with the coal gas at the inlet of the exhausters.

Before passing to the manufacture of coal gas, it may here be mentioned that the only holder at the Lane Bridge works is that used as a relief holder for the carburetted water-gas plant. The mixed gases from the exhausters pass successively through a Livesey washer for the removal of tar, a tower scrubber for the removal of naphthalene, a Holmes washer, lime purifiers, and oxide purifiers. They then, after measurement, are conducted by two mains, one 18 inches and the other 30 inches in diameter, across the town to the storage station. The gasholders consist of one five-lift and three three-lift holders, having an aggregate capacity of 2½ million cubic feet, or about 70 per cent. of our maximum daily output. This low proportion of holder capacity is rendered possible without inconvenience by the readiness with which the make of carburetted water gas can be altered to suit the exigencies of the demand.

To return to the gas-making plant, the old retort-houses which contained direct-fired horizontal retorts have been dispensed with, and there are now only two retort-houses, which are both situated close to the embankment of the Leeds and Liverpool Canal. The canal towing-path being at an elevation of about 40 feet above the general level of the works, the coal from the barges is easily introduced into the stores with a minimum of labour.

One of the retort-houses (erected in 1890) is fitted with two benches of inclined retorts, back to back, with a charging stage

15 feet wide between them. This arrangement, which dates from the early days of inclined retorts, has the disadvantage that men working on the charging stage are exposed to excessive heat. Each bench contains thirteen settings of six retorts. The retorts are 15 feet long by 24½ inches by 16 inches. The house is 141 feet in length and 75 feet wide. The walls are 32 ft. 6 in. high to the eaves; the roof being designed so as to accommodate the hoppers and coal-conveyors above the main tie-rods. In common with all installations of inclined retorts, the first settings were erected with ascension-pipes arranged to take off the gas from the lower mouthpieces. This led to considerable trouble in the early days of working; and all the retorts now have the ascension-pipes at the upper end, which the author conceives to be not only the natural position but the best in working and the simplest in construction. Although fairly high temperatures are employed and a considerable quantity of coal-dust is carbonized, a stopped pipe is a rare occurrence.

The other retort-house (recently erected) is 208 feet in length by 55 feet wide. The wall at the south side is 32 ft. 6 in. in height; but on the north side, which is adjacent to a coal-store, a roof truss 36 feet in span is carried on stanchions—the height of this part of the roof being 47 ft. 6 in. at the eaves. A lean-to roof, sloping down to the wall, completes the covering on the south side. In this way, sufficient height is obtained for the retort-bench, coal-hoppers, and conveyor, while the walls are kept down where the height is not required. This construction was adopted before it was decided to instal vertical retorts—being designed to accommodate inclined retorts; but it is equally advantageous for the introduction of the vertical system.

The coal-store on the north side of the retort-house is 139 feet long, with an average width of 56 feet, and is capable of storing 5000 tons of coal. The coal brought from the canal barges is tipped over a small hopper, from which it is fed over a screen on to a breaker. The coal from the screen and breaker is fed into a gravity bucket conveyor. This conveyor runs in a passage under the floor of the coal-store, and thence up a brick shaft to the roof, where it is supported on the upper part of the roof trusses, which are specially designed to accommodate it. Coal can also be fed on to the conveyor from openings in the floor of the coal-store. It is, therefore, possible with the one conveyor to deliver coal to or from any part of the store, and also to the boot of the elevator supplying the retort-bench coal-bunkers. The coal-breaker, elevators, and conveyors are driven by electric motors; the power being derived from a dynamo direct-coupled to a 40-H.P. gas-engine.

The vertical retort-bench is entirely supported on steel stanchions and girders; the bottom of the brickwork being 10 feet above the floor-level. There are nine settings, each containing four retorts. There are, therefore, 36 retorts in all, forming two rows of 18 each. The retorts are about 25 feet in length, oval in section, and taper from 29 inches by 20 inches to 20 inches by 8 inches.

The retorts are heated from producers at the front of the settings; the space round the upper part of the retorts forming the combustion chamber. The retorts with their supporting walls practically divide the combustion chamber and the whole of each setting into four parts, each of which is efficiently controlled by dampers—enabling the flow of producer-gas, primary air, secondary air, and waste gases to be regulated at will.

The coal is introduced into the retorts through a drum which rotates about once in two minutes, giving a feed of coal at each revolution more than sufficient to keep the retort always full of coal right up into the iron mouthpiece. The main work of the men on the top of the bench is to watch the coal entering the drum. If the drum does not take in coal at each revolution, it is then necessary to find the cause of the stoppage. Means are provided by which rods can be readily introduced when for any reason the coal sticks, and does not flow regularly into the retort. Stoppages occur most frequently with very soft, dusty coal—especially if the coal is one which cakes very readily. Nuts containing only a small proportion of dust do not cause much trouble in this way.

For the continuous carbonization of coal, the introduction of coal into the retort is comparatively simple. The problem of how best to remove the coke has been the one which has caused most trouble to inventors. The method finally adopted by Messrs. Woodall and Duckham commended itself to me, when I first saw it, as an admirable solution. The mechanism for this purpose resolves itself into two parts—the extractor shaft, by which the coke is continuously withdrawn from the retort, and the discharging drum, through which it passes into the open air.

The coke in the retort is supported on a curved cast-iron extension of the retort, at one side of which is a rotating shaft having projecting arms, which draw the coke out of the retort horizontally into the space over the discharging drum. This shaft rotates very slowly, making one revolution in from 45 to 55 minutes. This slow motion is obtained by a wedge-shaped pawl, actuating a grooved wheel. The pawl is driven from a rocking-shaft, the length of the arm on which it is adjustable. This adjustment regulates the speed of extraction, and therefore the rate of carbonization of the coal.

The discharging drum is similar in principle to that by which coal is fed into the retort; but, instead of continuously revolving, it is arranged to automatically reverse when it has accomplished a little more than half a revolution. Its capacity is sufficient to accommodate about half-an-hour's make of coke; and it is arranged to discharge about four times in the hour. A small quantity of water is introduced into the chamber above the extractor shaft to prevent the shaft and discharging drum from getting too hot. That the quantity of water is not excessive is shown by the fact that the coke contains less than ½ per cent. of moisture. The actual quantity of water used is about one gallon per retort per hour.

It is only during the last three days that we have been in a position to measure the gas produced by the verticals separately. I regret, therefore, that I am not yet in a position to give any results as to yield per ton of coal, inasmuch as in so short a period it is not possible to make an accurate estimate of the quantity of coal used.

In spite of many difficulties incidental to a new process, I feel that we shall soon be able to realize the hopes with which the installation was erected.

Discussion.

Mr. T. DUXBURY (Oldham) said they were all very much indebted to Mr. Leather for his most interesting description of the installation of the Woodall-Duckham system of vertical retorts; but they were at a disadvantage in not being able to discuss the subject, because they had no figures before them for the purpose. Unfortunately, Mr. Leather had not been able up to the present to dissect the working of the two plants—one for the inclined the other for the vertical. He (Mr. Duxbury) had hoped that by this meeting Mr. Leather would have had some information to lay before them as to the working of the new plant—such as the make per ton, the illuminating power more particularly, and also in respect to the tar and coke obtained from the verticals. They were all pleased with what they had seen; and they wished Mr. Leather every success with the new plant. He would like to ask Mr. Leather whether he had experienced difficulty with respect to stopped pipes. When he (Mr. Duxbury) was at Burnley five or six weeks previously, Mr. Leather had had, he understood, some difficulty in this direction when working at very high heat; and in order to ascertain if this was the cause, he contemplated reducing the temperature. He would like to know if Mr. Leather had during the last week or so experienced any benefit from reduced heat in working the retorts, and if he was still troubled with stopped pipes.

Mr. R. WATSON (Doncaster) had also a question to ask. But first of all he wished Mr. Leather and his Gas Committee success in their new installation. They all knew what Mr. Leather had achieved in the past with inclined retorts, and no doubt in good time he (Mr. Leather) would have something good to tell them about vertical retorts, after fuller experience with the working of them. The question he wanted to ask was, to his mind, an important one to those considering the matter of vertical retorts. As the Burnley installation was now complete, he would like to know if Mr. Leather was in a position to give them any information as to the capital involved—information which would be much appreciated by them all.

Mr. DUCKHAM (Messrs. Woodall and Duckham), at the invitation of the President, addressed the meeting. Dealing with the improvements which had been effected recently in the system, he said that one of the difficulties they had was with regard to the coke extraction. This had been the most troublesome part of their work. He was pleased to say, however, they had got over this trouble, and now had as perfect a control of the coke as it was possible to obtain. He was not altogether satisfied with the "show" given that day—one of the retorts having a certain amount of leakage, which was not in evidence before the previous day. There had been a change in the class of coal being tried in the retort. As to the question of capital cost, he put it down at £125 per ton, adding that in the case of a second installation the cost would not be as great. The Kensal Green plant in London was working most satisfactorily; and if they would like to see it, he would be delighted to make arrangements.

Mr. WATSON asked what the £125 per ton covered.

Mr. DUCKHAM replied that it did not include the coal-conveyor.

Mr. J. WILKINSON (Halifax) wanted to know if Mr. Leather could furnish any particulars as to the illuminating power of the gas produced from the vertical retorts and as to that obtained from the inclined retorts which he had working. He would also like to know the amount or the percentage of breeze made in the coke.

Mr. G. S. SAYNER (Harrogate) said he had been on the benches, and it seemed to him that the atmosphere was not exactly salubrious. Perhaps Mr. Leather would be able to tell them if this condition prevailed in normal times.

Mr. LEATHER, in responding, said that when Mr. Duxbury was at the Burnley works some weeks ago, they were certainly having some difficulty with stopped pipes; but he did not remember that the question of reducing the heat was spoken of as a means to ascertain if that was the cause. There was certainly something said about a slightly reduced heat with a view to trying a new coal. Whatever the cause of the stopped pipe, he did not think it would be affected by reducing the heat. There was no doubt about this—they had had difficulty in working a coal which was very dusty; and it must be remembered it took time to get used to the working of the plant. As he had remarked that morning during the inspection of the new plant, they had working on these vertical retorts men who had been accustomed to work two hours and then rest—playing draughts or dominoes—for an hour-and-a-half. These men were now more in the position of the

weaver, walking backward and forward continually to see that everything was going on all right. It took time to accustom them to this condition. They must understand that there was a fairly continuous supervision required, in order that they might find out at once if the retort was not working, because if it was not attended to immediately the trouble was intensified. The real cause of the trouble they had had was because the men did not do their work as well as they should have done. As to the cost of the installation, it was £10,400; and if they added to this the mechanical power, the capital cost would come within the figure given by Mr. Duckham—namely, £125 per ton. Answering another question put at this stage, Mr. Leather said this figure included royalties and patent rights. The plant, he added, had not been working sufficiently long and smoothly for him to give any definite figures as to the illuminating power. During the past week, it had been rather high—so high that they did not like to put it down. In regard to the coke, they did not reckon to make breeze at all. As a matter of fact, what they had was used for mixing with lime. The coke from the verticals was light, and very free from moisture. As to the observation of Mr. Sayner, he did not think that there was much to complain about in regard to the atmosphere.

VENTURI METERS FOR MEASURING LARGE VOLUMES OF GAS.

By J. L. Hodgson, B.Sc.(Lond.), A.M.Inst.C.E.

[A Paper read last Saturday before the Manchester District Institution of Gas Engineers.]

About fifteen years ago, the managers of the group of gold mines situated on the Witwatersrand (around Johannesburg) felt the desirability of establishing a central station for the supply of compressed air to the mines under their care. The difficulties in the way of such a scheme were enormous. About 40,000 H.P. in air had to be distributed to various mines along a line nearly 12 miles long—each mine taking (roughly) 2000 H.P. The capital outlay necessary was about £2,000,000.

One of the greatest difficulties in the way of the proposed scheme of air distribution was that of metering, at a reasonable cost, the air supplied to the various mines. For this reason, it for a long time seemed probable that the power would have to be distributed electrically—each mine obtaining the compressed air it needed from its own electrically-driven compressors. The balance was turned in favour of the compressed air distribution when, in 1908, Mr. J. L. Hodgson, of Messrs. George Kent, Limited, guaranteed to supply reliable air-meters by the date at which the Company were under agreement to deliver power.

The conditions laid down by the engineers of the Rand Mines with regard to the meters, were very stringent. The meters must not have any working parts in the pipe-line subject to derangement. Preferably they must be independent of the pipe-line altogether. They must correct automatically for pressure and temperature; must meter up to 2000 H.P., with the air at 120 lbs. per square inch pressure; and yet must not involve a friction drop of more than 3 inches of water gauge. They must measure down to one-thirtieth, and register accurately down to one-twelfth of full load. Lastly, their cost must not exceed £300 to £400.

Before deciding the lines upon which the new meter was to be developed, Messrs. Kent very carefully considered the suitability of every possible type of meter. The ordinary station gas-meter was of no use on account of its high initial cost, which cost would have been still further increased by the high pressure of the air which had to be metered. Meters of the fan type were barred on account of their having derangeable parts in the pipe-line. Displacement meters fitted with pistons were also unsuitable owing to the complicated nature of their parts, and the high pressure drop involved and the large initial cost. There remained only meters which involved the use of the Venturi tube or of the Pitot tube. Finally, it was decided to base the new meters upon the Venturi tube.

Messrs. Kent had had many years' experience with the Venturi tube in connection with the metering of large water-mains. They were entirely satisfied with its behaviour as a metering instrument; but no calibration experiments of any magnitude or accuracy had been performed anywhere to test its possibilities in regard to the metering of air and gas flows.

To this end, a calibration plant, costing several thousand pounds, was erected at Messrs. Fraser and Chalmers' works at Erith, Kent, by means of which the behaviour of Venturi tubes of all sizes was investigated. It was thus in connection with the Rand Air-Power Scheme that the Venturi meter for gas measurement was developed.

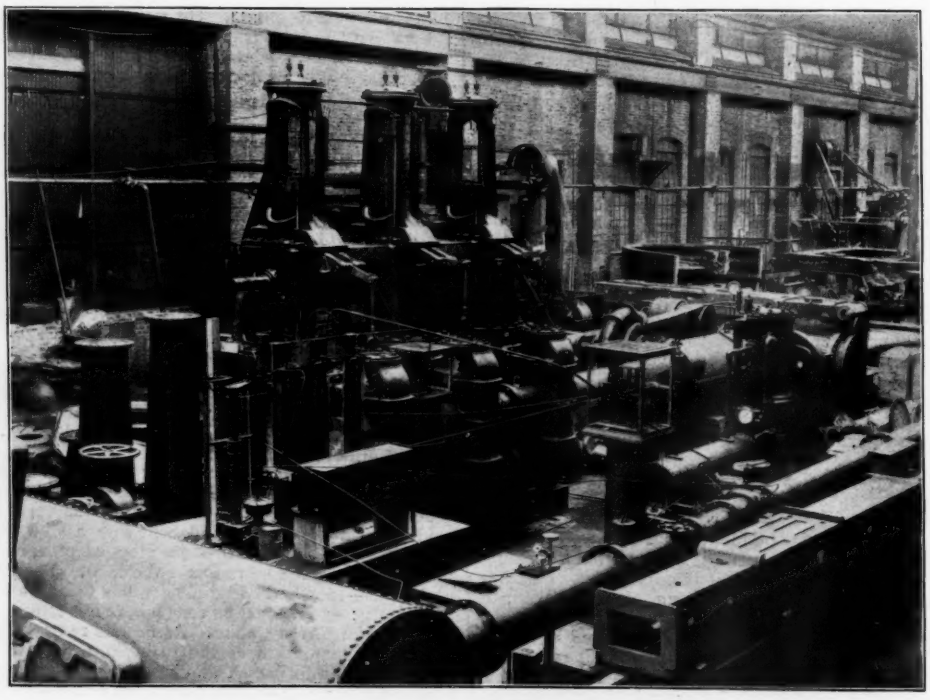
The Venturi tube itself consists merely of a short length of the pipe-line, in which the area is reduced by means of a converging cone, and then increased to its original amount by a diverging cone. The two cones are connected at their narrowest part by a parallel portion known as the Venturi throat. Since the throat is of smaller area than the rest of the pipe-line, the velocity of the air is greater at this point than elsewhere. Consequently, there is a fall of pressure between the commencement of the coned part above the throat (which is called the upstream) and the throat itself—just as there must be a fall of pressure between the inside and the outside of a vessel out of which fluid is escaping. It is this fall of pressure between the upstream and the throat which is a measure of the quantity of air or gas passing through the pipe-line.

Hence, if the relation between this fall of pressure (or Venturi head) and the quantity passing be known, the flow of gas may be accurately measured by nothing more complicated than the Venturi tube and a water-gauge.

The relation between the Venturi head and the quantity passing is given by the formula:

$$Q = K.A_1 \sqrt{\frac{h.}{T}.\frac{V}{(N^2-1)}.\frac{1}{D}}$$

where Q is the quantity of gas passing per second, reduced to cubic feet at standard temperature and pressure.
A_1 is the area of the upstream of the Venturi tube.
h is the absolute pressure of the gas at the metering point, in inches of water.
T is the absolute temperature in degrees Fahr. of the gas at the Venturi tube.
V is the Venturi head.



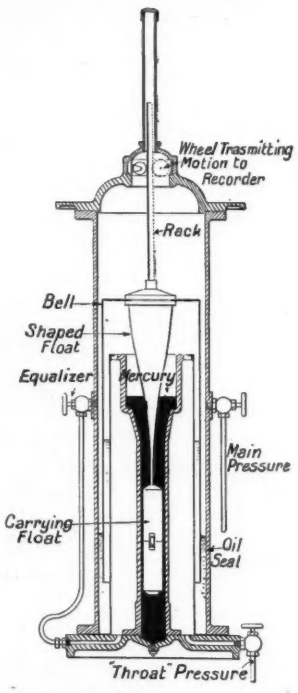
The Air and Gas Meter Calibration Plant at Fraser and Chalmers' Works, Erith.

N is the ratio of the area of the upstream of the Venturi tube to that of the throat.
D is the ratio of the density of the gas measured to that of air.
K is a constant whose value depends upon the size and throat ratio of the tube.

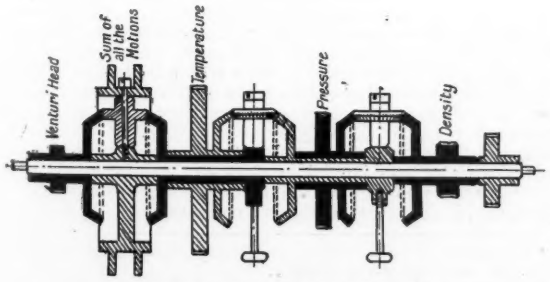
The experiments at Erith were directed to obtain the value of "K" for all sizes of tubes. This was successfully accomplished; and it is now possible with the data there obtained to say exactly, without further calibration, what will be the discharge of any particular tube.

Conjointly with these experiments, a recorder was devised by the author, whose function it was to automatically solve the equation given above; so that the quantity of air flowing, as indicated by the Venturi head, was measured and accurately recorded on a counter.

Messrs. Kent now construct three types of Venturi air and gas meters: (1) Those which correct for both pressure and temperature; (2) those which correct for pressure only; (3) those which, like the ordinary station gas-meter, correct for neither pressure nor temperature.



Bell and Float Actuating Mechanism of the Venturi Meter Recorder.



Differential Shaft on the Venturi Recorder.

It is this last type of meter—correcting for neither pressure nor temperature—which will probably prove most suitable for use in connection with gas-works, where it is part of the necessary routine to observe and make allowance for variations in the pressure and temperature of the gas. The readings of such a meter are corrected to standard pressure and temperature by means of a table of constants in the usual way.

In this connection, it is interesting to note that with the Venturi meter the corrections for any variations in the pressure and temperature of the gas are only half as great as are found with the ordinary station gas-meter.

That this is so will be obvious from an examination of the formula, where it will be seen that the correction for pressure and temperature varies as the square root of the factors, instead of being directly proportional to them as in the case of the station-meter. If, therefore, no correction for any variation of these quantities is applied, only half the error is involved.

The Venturi gas-meter recorder consists of two essential parts: (1) The part which measures the Venturi head and obtains from it a movement proportional to the quantity of gas passing at any instant. (2) The part which converts this movement proportional to the quantity into a registration on the counter.

The Venturi head is measured by the movement of a light inverted bell immersed in an oil-seal; the throat pressure acting on the underside of the bell and the main pressure on the outside. An increase of the flow causes the bell to sink. The weight of the bell is taken by a carrying float, which is always totally immersed in mercury. The amount of movement of the bell is determined by the shaped float—the bell descending until the difference of pressure due to the Venturi head is balanced by the buoyancy of the immersed portion of the shaped float. The bell carries a rack by means of which its motion is transmitted to a wheel, and thence through a gland to a cam placed outside the bell-chamber.

At the low Venturi heads, the bell gives a movement of 1 inch with perfect definiteness for a change in the Venturi head of only $\frac{1}{1000}$ lb. per square inch, and is sensitive to variation of pressure of less than $\frac{1}{10000}$ lb.

The recorder may be placed at any distance up to 500 feet from the pipe-line; and, if desired, several recorders may be used in conjunction with one Venturi tube.

The cam above-mentioned operates a feeler and sector which rotate a stop-arm through an angle proportional to the quantity of gas flowing. The sleeve to which the stop arm is attached is carried on a shaft which is revolved once every two minutes by means of a clock. This shaft carries a pawl which engages with a ratchet wheel fixed to a third shaft on the same centre and connected to the counter. The pawl is thrown into gear each time at the same point in the revolution of the clock-driven shaft. The position at which it is thrown out of gear, and consequently the quantity added to the counter reading, is determined by the position of the stop-arm.

It is in this simple manner that the meter measures the quantity of gas flowing. The bell causes the stop-arm to move through an angle proportional to the quantity flowing; and every two minutes the clock-driven shaft adds to the counter the amount of gas passed during that time. If the flow is so variable that it is advisable to have counter readings at less than two-minute intervals, this can easily be arranged for.

The meter is thus equivalent to an ordinary station gas-meter, but with the following points of difference: (1) It has no working parts in contact with the gas. (2) The recorder can be placed at practically any distance from the gas-main; and more than one recorder may be fixed to one Venturi tube. (3) By simply changing the Venturi throat, the meter can be arranged to deal with any permanent increase in the flow. (4) Its first cost, and the cost of installation, are much less than those of a station gas-meter.

In cases where tar or naphthalene is likely to be deposited from the gas, the Venturi tube, in common with the rest of the pipe-line, becomes coated with the deposit. This can be obviated by placing a steam or hot-air jacket round the throat and the upstream of the Venturi tube during the colder months of the year.

The drop of pressure across the Venturi tube is about 3 inches of water-gauge at full load. The recorder will register down to one-thirtieth of full load. At flows below this, it automatically cuts itself out and registers nothing.

It is possible that this limitation of range will prevent the employment of the Venturi gas-meter in the smaller gas-works, where the variation of the flow may be greater than this. A range of about 1:600 can, however, be secured by installing two Venturi tubes in parallel and two recorders—one set to deal with the larger and the other with the smaller flows.

The first Venturi gas-meter to be constructed has been installed at the Bromley and Crays Gas Company's works at Bromley, Kent.* The success of the Venturi meter for gas measuring purposes is to a very large extent due to Mr. Woodward, the Engineer to the Company, who has with the utmost kindness placed his great experience at our disposal, and assisted us in every possible way.

At the close of the paper,

The PRESIDENT complimented the author upon the way in which he had marshalled his facts and demonstrated his points by means of slides thrown on the screen, and said he understood the Venturi meters were being more largely used for the refinement of measurement in plants similar to water-gas plants than they were in the habit of doing at present in gas-works. It was evident, from what they had heard that afternoon, that the meters could be usefully employed where refinement in measurement was required.

Mr. E. A. HARMAN (Huddersfield) was of opinion that the Venturi system could be utilized with advantage for measuring the trade effluent to be paid for, and asked if Mr. Hodgson considered the meters suitable for this purpose.

Mr. HODGSON answered in the affirmative, and, in reply to a further question, said the meters cost from £150 up to £400—adding humorously that they were never likely to be adopted for the penny-in-the-slot system.

Mr. J. P. LEATHER (Burnley) thought the Venturi meters might be used for measuring the flow of gas in the mains, but was not sure if they could be adapted for this purpose.

Mr. HODGSON replied that this could be done. He thanked the meeting for their reception of him.

* Some interesting particulars regarding this installation were given in the "JOURNAL" for March 29, p. 869.—ED. J.G.L.

LONDON AND SOUTHERN JUNIOR ASSOCIATION.

The Eighth Annual Meeting of the Association was held on Friday at the Cripplegate Institute, Golden Lane, E.C.—the PRESIDENT (Mr. W. J. Liberty) in the chair. The business of the evening included the reply of Mr. J. G. Clark to the discussion on his recent paper, adoption of the report and balance-sheet, and election of officers for the ensuing year.

Reply of Mr. J. G. Clark to the Discussion on his Paper entitled "Some Practical Aspects of Radiation: Having Reference to the Uses of Illuminating Gas"—see "Journal" for April 26, p. 236.

The PRESIDENT, in calling upon Mr. Clark, pointed out that there was no time to properly answer the questions put when the paper was read.

Mr. CLARK said that, in reply to Mr. Sproxton, who put the first questions, he could only confirm the statement in his paper in regard to the thermal radiation which passed over the imaginary semi-cylinder. Such heat was, he thought, of no great value, and might be neglected for practical purposes. As to that gentleman's second question, it might perhaps be best answered by asking another question. Why did they assume an imaginary line passing through the centre of the earth and inclined at, he thought, about 67° with the ecliptic, and call it the earth's axis? Simply because it was around such a line that the axial motion of the earth was symmetrical, and it therefore served as a convenient origin for the latitudinal and longitudinal division of the earth. Similarly with the lighting problem. Having surrounded the source of light by a sphere, it was convenient to consider the distribution of the light by referring to a line about which the desired illuminating effect was symmetrical. The only such line one could think of, was a line at right angles to the surface illuminated; and from this the horizontal and the other latitudinal lines naturally followed. The horizontal line was therefore not arbitrary, but had an important practical significance.

Mr. K. SPROXTON remarked that one could not put the axis of the earth in any other place; whereas with the author's diagram (which seemed to him rather misleading) he found that if he read the diagram when lying down, the horizontal rays were depreciated and the vertical and downward rays were increased.

Mr. CLARK: I may point out that, though the relative position of the horizontal line to the line of vision would vary with the latter, it did not affect the argument. The horizontal must be considered as one parallel to the surface illuminated—*i.e.*, the ground surface or a table. You will see that the methods of calculating the spherical and hemispherical values of sources of light depend upon the same idea; the candle powers at the various angles being multiplied by the factors given in the table in the paper.

Mr. SPROXTON: The light from an ideal point is distributed evenly in all directions. But as there is so much more light distributed horizontally, because there is a very much greater area, than in the downward direction, these rays should be collected and distributed where they are wanted.

Mr. CLARK replied that this was the very idea he developed in the paper. He showed the high value possessed by these horizontal rays, and endeavoured to make it clear that it was of great benefit to collect them by means of reflectors, and throw them where they were wanted.

Mr. SPROXTON: As to my first question, can you tell us from your actual experience, taking a horizontal line from the top of the radiating surface, up to what angle your radiometer measures from the horizontal. Is it about 70°?

Mr. CLARK: I think it would be nearer the vertical than that.

Mr. SPROXTON: What struck me was that your treatment of the horizontal radiation was very different from the vertical radiation. You presume that all the radiation over an angle of 80° or 75° is lost; but in measuring the horizontal radiation, you go right round to the angle of 90°.

Mr. CLARK: The horizontal and vertical planes are rather different from each other. While the radiation lost over the top of the imaginary semi-cylinder is of no great value, since it falls on a small patch of the ceiling, that which is intercepted by the extreme side edges of the semi-cylinder falls upon the floor and ceiling, and does useful work, and should therefore be placed to the credit of the fire. I may say that it was only after careful consideration of the whole question that the semi-cylinder was decided upon as the standard heat-receiving surface. It is, of course, quite obvious that, instead of using a straight calorimeter tube, we might use one of semi-circular or quadrant form. Such tubes would, when placed at the various positions round the fire, trace out a hemisphere or a quarter sphere, and so intercept the whole of the radiation; but I am of opinion that a straight tube used on the lines described in my paper is the most satisfactory.

Mr. SPROXTON: In the case of apparatus having a very large radiating surface, do you make any alteration?

Mr. CLARK: The instrument is intended for the measurement of the radiation from an incandescent surface—a coal, a coke, or a gas fire—within any reasonable limits. Any common gas-fire would come into those limits quite easily. Continuing his reply to other speakers, he said that Mr. Hogg took it that the diagram referring to radiation from the fire just showed the alteration of the intensity of heat over angles in the horizontal plane. He asked whether he had thought it was at all desirable to measure the variation in angles over the vertical plane, similar to the light rays. His reply was that the diagram obtained with the thermopile referred to a horizontal plane level with the centre of the fire. He had not considered it desirable to explore the vertical plane in the same way. A serious objection to the use of the thermopile for this purpose was, in his opinion, the fact that the radiation reached the pile partly by direct transmission and partly by reflection. This could be illustrated best by a diagram. Let the sketch represent a section through the head of the thermopile. The interior of the conical receiver was highly polished, so that the radiation which fell thereon was reflected towards the couples. If they assumed that the instrument was set up opposite the centre and 4 feet from a 14-inch fire, then the lines entering the mouth of the receiver would represent a portion of the radiation from the extreme outer edge of the incandescent fuel. It seemed quite clear that, before the radiation reached the pile, it was reflected a number of times. In order, therefore, that the readings on the galvanometer should be proportional to the radiation which entered the receiver, either the polished surfaces must have a reflecting efficiency of 100 per cent., or the proportion of reflected to direct radiation which reached the pile should be constant. The first condition was practically impossible; and the second could not be ensured, because if a fire was surrounded by a hemisphere, then the solid angle subtended by the incandescent surface of the fire at any point on the surface of the hemisphere, would vary with the position of the point. He had considered as a means of getting over the difficulty the disuse of the conical reflector or the blackening of its interior; but the radiation then reaching the galvanometer was rather small. That they should have strict proportionality between the radiation entering the mouth of the receiver and the potential difference set up by the pile was of the greatest importance if the galvanometer indications were to be taken as a basis for the calculation of the thermal value of the radiation. Time would not permit of the discussion of the matter in full; but perhaps he had said enough to indicate its importance. He had, however, prepared a short analysis which the members might have an opportunity of perusing in print.* As to Mr. Canning's point, it appeared, in round numbers, that about one-third of the energy of combustion in a gas-fire took the form of radiation. The questions of quality and type of fuel, character of flame, form of the fire-front, and a number of other factors, entered into the problem. With reference to the heat lost from the calorimeter when in action, he presumed that Mr. Canning was alluding to the heat which might pass from the water to the surrounding air. This, however, was not necessarily a loss, but (as was more usual in practice) it might be a gain—depending upon whether the water in the tube was cooler or warmer than the surrounding air. But if with the calorimeter in a given position they could assume the loss or the gain to be the same whether the radiation was obscured from or absorbed by the calorimeter tube, the obscuration method cancelled it out. The only question was, Was the loss or gain the same? The temperature of the water passing through the calorimeter tube was from 1° to 4° lower when the radiation was obscured than when it was absorbed; and probably the heat which passed between the water and the surrounding air would vary in consequence. It was for this reason that the rise of temperature of the water in passing through the calorimeter was limited to 4° or 5° C., as by so doing the possible error was minimized. He intended to investigate this point, and, if necessary, to obtain a correction curve. In answer

Diagram No. 1.

* It is interesting to trace the course of a ray through a conical reflector such as is used with the thermopile.

Let the angle of incidence of a ray when it first reaches the surface at A be θ, and let the angle between the walls of the reflector be α. The angle of reflection at A will, of course, be θ; but the angle of incidence when it reaches the opposite surface at B is only $\theta - \alpha$. It appears, therefore, that the angle of incidence is reduced by α at each reflection; and if the ray does not reach the pile before the angle becomes 0° or a minus quantity, it will not reach the pile, but will actually return.

If the ratio $\frac{\theta}{\alpha}$ is a whole number, the angle of incidence will ultimately become 0°, which means that the ray will return upon itself.

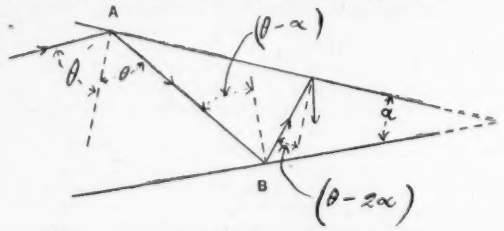


Diagram No. 2.

to Mr. Ainsworth, he thought with the modern gas-fire 15-10ths to 17-10ths was a good working pressure. The griller referred to in the paper was a cast-iron fret heated by a single burner having two rows of flames.

Mr. AINSWORTH: Do you take the same pressure for the griller?

Mr. CLARK: For that you might take about 20-10ths. Continuing, he remarked that there was, of course, a good deal in what Mr. Eldred said about the use of diagonal opal globes for shop front lighting. Some shopkeepers preferred, however, to make their windows conspicuous by obscuring the light in other directions. It was largely a matter of taste. The general effect of the diagonal opal globe as a reflector would be similar to that of the parabolic reflector alluded to in the paper. As to Mr. Wedd's queries, the height of the incandescent fuel of the fire above the surface of the hearth was a very important matter from a practical point of view, and one which might be profitably studied. But it opened up much too large a field to be discussed fully on the present occasion. He could not speak definitely with regard to the comparative radiation from the incandescent mantle and an argand flame. The radiant energy of the argand flame was no doubt very high, though of a low order from a luminous point of view. The radiation was due to the incandescent carbon in the flame; and carbon was an exceedingly good radiator. He might say, in reply to Mr. Hewett, that the use of the radiation calorimeter in a portable form had been considered. It was probable that a smaller instrument could be made for this purpose, in order to minimize the water requirements. With reference to the reading of the thermometers, these were not so far apart as to raise any difficulty. He had, however, considered, from the point of view of convenience, the use of a prismatic eyepiece for the lower thermometer. The line of sight would then be vertical; and the readings could thus be taken more comfortably. He was interested in Mr. Fenn's remarks on the subject of the front bars of a gas-fire. In conclusion, he appreciated very much Mr. Lacey's kindly criticism, and fully agreed with him as to the importance of research regarding the utilization of gas. No one who was watching the signs of the times would have any doubt as to the bright prospects before gas as a domestic and industrial servant; and these prospects would be made still brighter by further research.

General Business.

The members then proceeded to transact the ordinary business of the annual general meeting. Before doing so, however, the PRESIDENT referred to the loss sustained by the nation through the passing away of King Edward VII., and said it was only fitting that they should testify their esteem of the late Monarch and sympathy with the bereaved Royal Family.

This having been done, the meeting then proceeded to the consideration of the report of the Council, recommending that the Association should in future meet at the Westminster Technical Institute, Vincent Square, Victoria. The report was adopted unanimously. After the adoption of the balance-sheet, the following were elected as Officers and Council for the session 1910-11.

President.—Mr. L. F. Tooth (Commercial Gas Company).
Vice-Presidents.—Mr. T. F. Canning and Mr. J. G. Clark.
Members of Council.—Messrs. F. Ainsworth, H. Rothwell, E. Sears, K. Sproxton, P. J. Smithers, E. G. Stewart, W. Upton, D. J. Winslow, and W. J. Liberty (*ex officio*).
Hon. Secretary.—Mr. S. A. Carpenter.
Hon. Treasurer.—Mr. J. Hewett.
Hon. Auditor.—Mr. E. G. Merry.

The PRESIDENT then gave a *résumé* of the work for the session, in the course of which he mentioned that the membership was now 127, representing 37 gas undertakings (as against 21 last year). The membership at the end of the 1908-9 session was 113; and there was thus a net increase of 14 on the present occasion. In addition, there were two honorary members and 23 patrons. The resignations numbered 23; while 37 names were added to the roll. These 37 new members were the result of his plan of communicating with the engineers of works outside London. The wide area from which the members were now drawn, made it really a "Southern" Junior Association, and not London only. The Association never stood higher in the esteem of the seniors than now. The year had been one of progress in engineering science, and marked by many new methods in the industry; and he could but repeat the words used by him last session—namely, "Many are the changes taking place; and fortunate are the members who are in training in the profession during this time of transition and new development." He had nothing but pleasant memories as a result of his two years of office.

A vote of thanks was then passed to Mr. W. J. Liberty for the manner in which he had occupied the presidential chair and worked for the Association during the last two years—and more especially for his having come forward to take the position of President for a second period at a time of emergency. It was resolved that the vote be suitably inscribed, framed, and presented in due course.

The PRESIDENT, in reply, assured the members that, though he was taking off his armour, he was not casting it away, but would be ready to put it on again in future to serve the Association.

A vote of thanks was also passed to Mr. S. A. Carpenter (Hon. Secretary), Mr. J. Hewett (Hon. Treasurer), and Mr. E. G. Merry (Hon. Auditor).

REGISTER OF PATENTS.

Production of Recoverable Ammonia in the Manufacture of Producer Gas.

MASONS GAS POWER COMPANY, LIMITED, of Levenshulme, Manchester, MOORE, Q., jun., of Glasgow, CUNNINGHAM, J., of Banbury, and STOKES, J. W. B., of Tollcross, Lanark.

Nos. 28,053-54; Dec. 24, 1908. Accepted March 24, 1910.

According to an abstract of these two specifications appearing in a recent number of the "Journal of the Society of Chemical Industry," the producer described in the first patent is of the type having three zones of different temperatures—viz., a combustion zone lined with fire-brick, an intermediate zone above it, and a cool zone at the uppermost part of the producer; the supply of raw fuel and the removal of ash taking place continuously. The arrangement is such that the uppermost zone acts as a condenser for the more volatile hydrocarbons, while the intermediate zone is kept at from 400° to 475° C., being about half the temperature of the combustion zone, so that the heavier tars are condensed on the coal therein and are carried down with it and converted into fixed gas in the combustion zone. The producer is elliptical or rectangular in plan, and increases in cross section from top to bottom. The intermediate zone, which is water-jacketed, is about 8 feet high, or twice the height of the combustion zone. The uppermost zone, which may be air-cooled or water-cooled, is of less height than the combustion zone. The total height of the producer is great compared with its cross section. The producer is blown with air and a large quantity of steam; the steam being obtained from the water-jacket and also by a jet of water playing on the ashes. In the second arrangement, the producer is similar to that described above; the temperatures of the three zones being kept at 800° to 1000° C., 300° to 450° C., and 80° to 150° C. respectively. By this means the excess of steam necessary to prevent destruction of ammonia in the producer is reduced—over 60 per cent. of the steam used being decomposed. The gases leaving the producer are cooled in surface condensers, and the ammonia is extracted without the use of acid, by washing with water.

Treatment of Residues Obtained by the Burning of the Spent Oxide of Gas-Works.

WILLIAMS, P. E., of Leytonstone, Essex.

No. 2813; Feb. 5, 1909.

This invention relates to the treatment of the residues obtained by burning off the sulphur from spent oxide produced in the removal of sulphuretted hydrogen from coal gas; and it has for its object the production from such burnt residues of an efficient purifying material suitable for re-use in the absorption of sulphuretted hydrogen from gas.

The burnt residues referred to, the patentee points out, vary very much in composition, and in many cases contain much sulphate of calcium, which is an inert material so far as the purifying efficiency of the residue referred to is concerned. In burnt residues of the kind alluded to, ferrous sulphate is invariably present, and often in considerable quantity.

To treat the burnt residues in such a manner that they will form an efficient absorber of sulphuretted hydrogen from coal gas, the iron salts formed in the residue by the burning process are converted into hydrated oxides of iron, which are mixed with the iron oxide forming the bulk of the residue left after burning.

According to one way of carrying out the invention, the burnt residue is treated with warm water in such a manner as to dissolve out from it the soluble iron salts, and also some of the sulphate of lime that may be present. The burnt residue may be treated as described, by placing it in warm water immediately on removal from the spent oxide burner, or it may be stored in the ordinary manner and kept either wet or dry and treated with warm water as and when required.

For dissolving out the salts, there may conveniently be used a shallow tank formed of suitable material—brick, wood, or iron—in which the material to be washed is placed and then covered with water (preferably warm), so as to dissolve out the soluble iron salts present; the solution being run off, through a filter if necessary, into a tank, and the washing repeated or not as may be desired. The quantity of sulphate of lime present in the residue may be reduced by further washing with warm water.

The solution of iron salts thus obtained is then treated with an alkali, for which purpose caustic soda is preferred, although other alkalies may be used if desired; and the whole of the hydrated iron oxide formed is allowed to settle. The supernatant liquor is preferably afterwards run off and the hydrated oxide of iron thrown on to an absorbent material (say) sawdust, in order to absorb the excess of moisture and assist in giving porosity to the finished material. Or the hydrated oxide of iron may be freed from the solution of sulphate of soda, to a considerable extent, by allowing the solution to percolate through a filter of any convenient form, after which the hydrated oxide of iron may be thrown on to sawdust. After being washed, as described, the burnt residue is preferably rendered slightly alkaline by adding to it a solution of an alkali; the alkaline solution being allowed to drain off if desired. The washed burnt residue and the precipitated hydrated oxide of iron with sawdust are then intimately mixed together in suitable proportions, and, if necessary, more sawdust is added.

A very active material, suitable for purifying coal gas, can be obtained by adding to the washed burnt residue as little as 1 per cent. of the precipitated hydrated oxide of iron; but the activity of the material can be increased by increasing the proportion of hydrated oxide of iron (say) up to 5 per cent. Where it is found that insufficient soluble iron salts are present in the burnt residue, a solution of ferrous or ferric salt obtained from some other source is used, and precipitated as described. As a rule, the patentee states, more ferrous sulphate is found in the burnt residue than is needed for the preparation, according to this

invention, of an active purifying agent. n this case, the excess portion of the solution of iron salts can be treated for the preparation therefrom of crystallized sulphate of iron, or for making additional oxide of iron, by precipitation, for use in the purification of gas or for other purpose.

Instead of dissolving out the salts from the burnt residue, precipitating the hydrated oxide of iron from the resulting solution, and mixing the hydrated oxide of iron, or some of it, with the washed burnt residue as described, the burnt residue may be at once treated with a hot alkaline solution, as by dropping it into such solution, so that the iron salts in it will, by interaction with the alkali present, be converted into hydrated oxide of iron; while the alkali will be converted into an alkaline salt which will dissolve in the liquid present and can be drained off. The resulting product, consisting mainly of burnt oxide of iron and hydrated oxide of iron, can then be mixed with sawdust to render it ready for re-use.

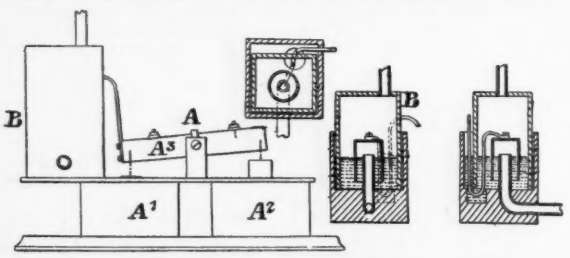
The mere neutralization of the free mineral acid contained in burnt residues of the kind referred to does not, the patentee proceeds, necessarily render the material suitable for the efficient removal of sulphuretted hydrogen from coal or other gas. He has found in practice that when the burnt material has been merely treated with an alkali to neutralize the free acid in it, and the material has been again used for the absorption of sulphuretted hydrogen from coal gas, it has again become acid and the absorption of gas retarded, owing to the presence of the sulphate of iron therein. The conversion of the iron salts in the burnt residue into hydrated oxide of iron, as described, is therefore essential for the preparation from such residues of a purifying material that can be relied upon to absorb a high percentage of sulphuretted hydrogen from coal gas.

Controlling the Supply of Gas.

RORKE, T. J. & E., of Barnes, Surrey.

No. 8551; April 8, 1909.

This apparatus for controlling the flow of gas for use in heating, lighting, or other purposes, consists essentially of a controller adapted for being actuated by an electrically-operated switch in conjunction with thermostatic or other means, either from a distance or otherwise. It comprises an electro-magnetically controlled switch, of the type described in patent No. 12,175 of 1908, the rocking arm of which is provided with a member adapted to act in conjunction with a liquid seal whereby the desired control is effected upon actuating the switch.



Rorke's Gas Controlling Apparatus.

The illustration shows an elevation of the whole apparatus, with sections of the inlet and outlet passages for the gas.

A is an electro-magnetically controlled switch; and A^1 A^2 are electro-magnets. A^3 is a rocking member or tube containing a moving mass of mercury which serves to control the energizing of the electro-magnets as described in the earlier patent. One or both ends of the rocking member are provided with a bent extension or arm which carries a bell, which acts in conjunction with the outlet pipe to close it and form a liquid seal for the gas. The liquid seal is formed in the end chamber B, which comprises two members fitting one within the other; the inner member carrying the inlet pipe for the gas and the latter member the outlet pipe. The outlet pipe projects upwards within the outer vessel, and the bell, which is carried by the rocking member of the switch, is adapted to cover it, so that the flow of gas is interrupted by the liquid around the outlet pipe, into which the bell projects when the arm is deflected upon the actuation of the switch A. The outer vessel is formed with a well, which allows of the depression of the arm whereby the movement of the bell is effected without disturbing the inner member of the gas-chamber B.

When the gas enters the chamber B, the bell is raised out of the liquid, and the gas flows through the outlet pipe to the place where it is required for use. To avoid danger of explosion by leakage of gas, the bell is provided with an opening at its upper end to allow a small quantity of gas to pass, so as to ensure the ignition of the larger volume which passes when the bell is raised out of the liquid seal, in order to allow the unrestricted flow to take place.

The apparatus may be employed for "flash advertisements" by arranging a series to control the illuminated compartments of the sign. In this connection, an automatically operated switch would be employed to operate the several sets of apparatus.

When the apparatus is used in connection with a heating system, the flow of gas may be regulated automatically by providing a thermostatic arrangement, as described in patent No. 9481 of 1908, for controlling the circuits of the actuating electro-magnets, so as to render them operative at a maximum and a minimum temperature.

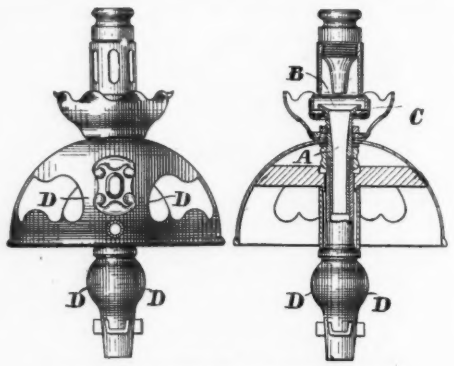
Inverted Incandescent Gas-Burners.

SPERRYN, G. N., of Birmingham.

No. 9757; April 24, 1909.

This invention has reference to burners provided with means for preventing damage to the mantles from vibration or shocks, as shown in the elevation and sectional elevation.

The mantle-supporting portion of the fitting is connected to the injector tube A by a small screwed muff B; and it is flared at the top so as to rest on the spring C, which supports the part D of the fitting. All the parts in this portion D are connected to the flared injector tube, and by this are supported from the centre of the spring C without other connection to the upper part. Shocks or vibration on the support are thus prevented from coming on the part which supports the mantle. Also, owing to the support on the flared injector being practically in one plane, the part D is allowed a degree of freedom to pivot, so that a knock or blow on it causes it to give way or swing on its support—thus avoiding damage.



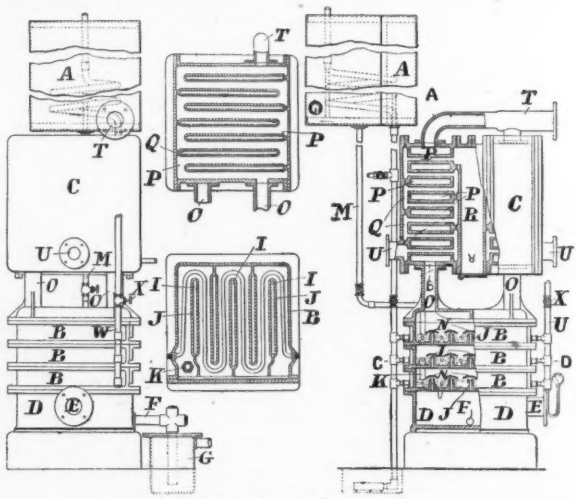
Sperryn's Inverted Incandescent Burner.

Carburetting Gas.

TULLY, C. B., of Hythe, Kent.

No. 13,549; June 9, 1909.

This invention relates to a still of the kind in which liquid-containing superposed trays are formed with slits to permit of the passage of fluid in thin streams through it, and passing the gas, on its way to a fixer, successively through the tray slits and over the liquid hydrocarbon in the still, "so that it becomes rapidly enriched." The invention is particularly applicable to the carburetting of methane hydrogen gas with hydrocarbons evolved from tar.



Tully's Gas-Carburettor.

In the construction illustrated, A is the dehydrating tar-tank, B a series of perforated stills, and C a pair of fixing-chambers. The stills are mounted upon a receiver D, having an inlet E for the gas to be treated and an outlet F for tar communicating with a sump or other receptacle by way of a seal-pot G. The stills comprise three superposed trays, each having a series of slits I arranged in vertical walls or partitions J, so disposed as to form a sinuous channel along which tar can flow from one end to the other, where an outlet delivers it to the initial end of the tray beneath—the discharge of the lowermost tray taking place into the base section. K is the outlet from the intermediate tray to the lowest one.

The tar is delivered into the tank A, which is at such a height above the carburettor as to cause the tar to flow, under pressure, through a pipe M leading to the initial end of the upper tray B, provided with a control valve for varying the tar supply.

The slits in the trays are surmounted by baffles N, which deflect the gas as it rises through the slits on to the tar in the trays, whence it finally passes into the inlets O of the pair of fixing-chambers C. The chambers are supported above the uppermost tray B, and each of them has a sinuous upwardly extending passage P, constituted by hollow walls, plates, or partitions arranged to constitute a sinuous downwardly extending flue Q for the passage of heating gases from a combustion chamber R between the fixing-chambers. The carburetted and fixed gas from both fixing-chambers is led off at T—an outlet common to both fixing-chambers; but the spent heating gases may afterwards be led away by independent outlets U.

For the purpose of heating the tar in the several trays, sinuous steam pipes are arranged in the channels shown, and connected (it may be in parallel) to a steam supply pipe W; the opposite ends of the pipes being connected to a pipe which may extend downwardly and termi-

nate in a steam-trap, and upwardly for connection to a heating coil in the tar dehydrating tank. By means of a steam inlet valve X and a valve in the steam-pipe leading to the tar-tank, the stills alone can be heated to the desired extent with the aid of the steam-trap, or the tar in the tank may, in addition, be heated to drive off moisture from it by admitting steam to the coil therein.

Gas-Purifiers.

KÖLNISCHE MASCHINENBAU ACTIEN-GESELLSCHAFT, and WEGESCHEIDT, C., of Cologne.

No. 16,243; July 12, 1909.

This invention has for its object "to utilize in the most favourable manner possible the space of the purifier, and to obtain the best possible purification, and to manufacture purifiers having a very large

Fig. 1.

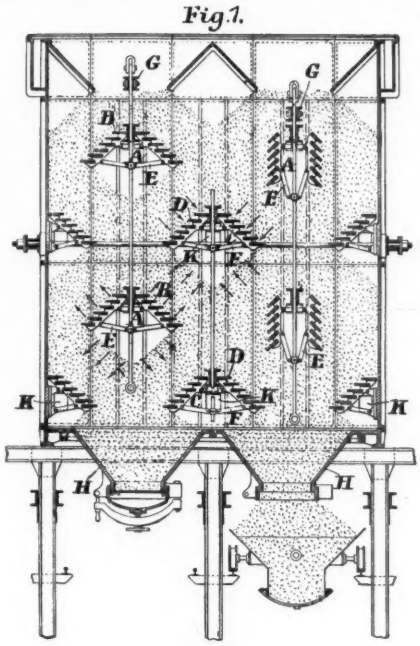


Fig. 2.

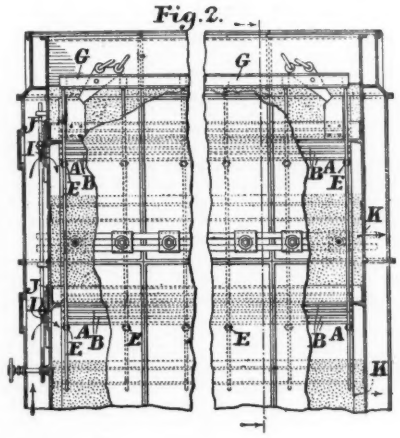
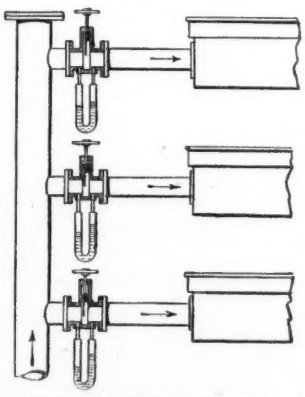


Fig. 3.



A German Purifier Arrangement.

output." With the arrangement proposed, the thickness of the layers of purifying material through which the gas to be purified has to pass can be varied according to the distance of the introducing conduit from the discharging conduit; and at the same time it is possible to make purifiers of any desired output, "as the gas to be purified has merely to travel from its supply pipe to the discharge pipes which are adjoining it, so that apparatus of any desired height may be built."

Fig. 1 is a vertical section through the purifier, in a direction transverse of the gas-conduits. Fig. 2 is a portion of the purifier (partly in section and partly in side elevation) in the direction parallel to the gas-conduits. Fig. 3 is a diagrammatic view of the regulating and indicator device for different pipes, branching off from a single supply.

The purifier chamber has its two front walls at right angles to the gas-conduits arranged in the purifier. They are formed as double walls, and support a number of girders, which, in their turn, support louvres. The louvres pass through the purifier from one wall to the other, and are distributed as uniformly as possible in the space. The louvres which afford support to the purifying mass form "canal-like hollow spaces" in the interior of the purification mass, which hollow spaces form flues for the gas. The louvres are divided into two groups —one group A forming, with the supporting plates B, the supply conduit for the gas; and the other group C forming, with the support plates D, outlet conduits for the gas. The louvres are pivoted at their upper ends to projections on the girders, while the bottom ends are pivoted by links E or F to longitudinally adjustable rods mounted vertically in the purifier, and connected at the upper end by strong girders at G. The girders are held in the raised position by a supporting device consisting of cams rotatably mounted in connection with abutments secured to the apparatus. The lower end of the apparatus is provided with conical outlet branches H for the purifying mass, which are held closed by lids with closing brackets.

The working of the purifying device is as follows: Before the purifier is started, it is filled with the purifying mass in such manner that under each of the louvres A B is left a conduit-shaped hollow space, the shape of which on the lower surface is determined by the angle of slope of the material. After the apparatus has been filled, gas is admitted and spreads among the various conduits closed by the louvres A, passing through the openings I. By suitably adjusting the slide valves J, the admission of gas to the conduits corresponding to the louvres A can be regulated. From the inlet conduits arranged under these louvres, the gas passes through the intermediate spaces between the supporting surfaces B, into the purifying mass, and penetrates through the layer of it between the supply conduit and the outlet conduits arranged all round and formed by the louvres C. From the outlet conduits under these louvres, the purified gas passes through the openings K into the space between the walls, and is carried away from that point. The layer of the purifying mass through which the gas is to pass can be made of any desired thickness, but a thickness of layer of about 600 mm. has been found very suitable.

When it is desired to empty the purifier, the rods are moved from their raised position into the lower position. The rotatable supporting plates then slide away from the abutments, so that the rods sink; the louvre assuming the position shown in one group. Owing to the rotation of the louvres, all support is withdrawn from the purifying mass; so that when the closing devices are opened, the purifying mass is freely discharged through the outlet cones H.

Fig. 3 shows a device for a more accurate control of the flow in the various gas-conduits, by means of adjustable throttling valves mounted in the supply conduits arranged side by side. Branch conduits lead from the pipes in front of, and behind, the throttling valves to a differential pressure gauge, which indicates the currents in the pipe sections. Calculation shows that if the cross-sectional area of passage left free by the throttle valve be indicated by F, the quantity of gas passing through the pipe by V, the difference of pressures in front of, and behind, the throttle valve by h and a constant by C, then $V = C.F.\sqrt{h}$. If F is fixed as a function of h in a table for a given V, it is possible, without difficulty and special training, to adjust the passage of gas, in accordance with the indications of the pressure measuring devices, to the desired extent.

In order to provide the purifier illustrated in figs. 1 and 2 with the regulating device described with reference to fig. 3, the pipe sections carrying the throttle valves and the pressure-gauge devices could be mounted on the wall of the purifier in alignment with the inlet openings I. A plurality of rows of inlet openings would, of course, require a plurality of rows of pipe sections with throttle valves and pressure-gauge devices.

Differential Pressure Gauges.

KENT, W. G., and HODGSON, J. L., of High Holborn, W.C.

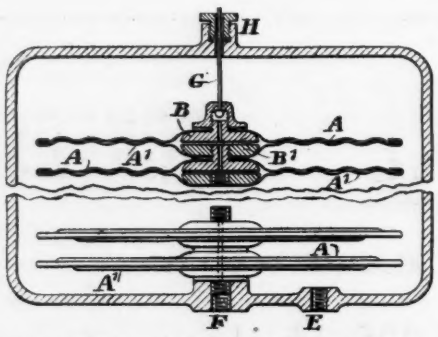
No. 17,638; April 27, 1909.

This differential pressure gauge is said to be "very sensitive to small differences of pressure and less sensitive to large differences of pressure; while it cannot be damaged by overloading."

In its simplest form, it consists of a pair of flat discs corrugated to render them flexible and united together around their peripheries, so that as the load is put on they come into contact with one another from the periphery towards the centre.

The illustration on p. 568 shows the gauge made in its closed position due to the maximum difference of pressure.

A A^1 are the two members of each pair of discs (substantially flat, but corrugated to render them flexible) provided with stiff centre-pieces B B^1, so arranged as to allow any number of pairs of discs to be secured together. The discs are contained in a pressure-tight box to which the high pressure may be connected by the inlet E, while the lower pressure may be connected to the interior of the discs by the inlet F. One end of the series of discs is secured to the box, while the other end carries a rod or wire G, which passes out of the box through a gland H. It is pulled upwards by a spring or equivalent device, so that normally—that is, when the pressure outside the discs is equal to that inside—the discs are deformed, and there is a gap between the centre-pieces B B^1, and the discs touch only around their peripheries. When, however, there is a difference of pressure, the discs tend to come together; their motion being resisted by the pull of the wire G. As the pressure increases, the discs close together from the circumference inwards; so



Kent and Hodgson's Differential Pressure Gauge.

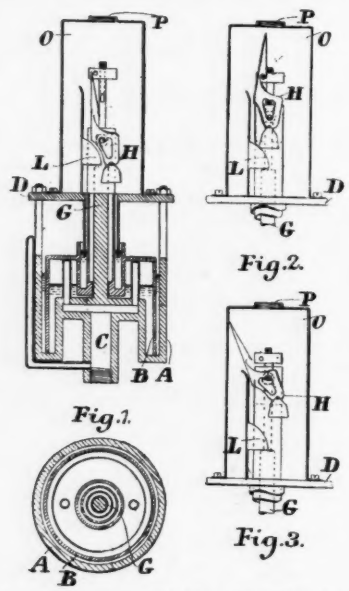
that the area of unsupported disc exposed to the pressure gradually diminishes. Finally, when the maximum desired difference of pressure is reached, the discs and the centre-pieces touch one another at every point, and no further increase of the difference of pressure causes any further motion. The motions of the wire G can, of course, be transmitted to an indicator.

Igniting and Extinguishing Gas-Lamps.

MOWAT, J., of Helensburgh, N.B.

No. 18,243; Aug. 7, 1909.

This gas-lamp igniting and extinguishing apparatus is of the kind wherein variation of the pressure of the gas in the mains is utilized to effect ignition from a pilot jet and also extinction of the light.



Mowat's Gas-Lamp Lighter and Extinguisher.

Fig. 1 is a vertical and horizontal section of the apparatus. Figs. 2 and 3 show the upper part of the apparatus in different positions.

The gas-main is connected to a tank A within which is fitted an inverted gas-container B, guided in its vertical movement by a central rod G. The space between the tank and the container is filled with mercury, so as to form a seal between them as heretofore. A small tank, concentric with the container B, also contains mercury, and forms a seal between it and a tube suspended from, and rigid with, a platform D held fixed above the tank A by supports. A tube or sleeve attached to the inner tank extends through the mercury seal in the tank and through the platform D, and carries at its upper end a movable hook H, provided with a triangular slot; while a movable weight which is attached to the lower end of the hook acts as a balance. The hook is adapted to engage a pin secured to a block on the upper closed end of a tubular extension of the guide-rod G. A fixed cam L serves to push the hook H into the position shown in fig. 1, in which position the inner container is at its lowest or normal position. The pipe C admits gas from the mains; while a bye-pass attached to the pipe allows of the ignition of the gas when required. The gas is admitted from the central tube to a container O.

The *modus operandi* of the apparatus is as follows: The gas is admitted by the passage C into the interior of the container B, which remains stationary when the pressure is normal or at the ordinary working pressure. When the pressure is raised above the normal, the container B will rise until the upper end of the inner tank comes in contact with the lower side of the platform D. When the container B is in this position, the lower part or bottom of the mercury seal within the tank will be above the level of the mercury in the tank A, and the gas from the interior of the container B will have a clear passage between the inside of the inner tube and the exterior of the central rod or guide G. During the upward movement of the container B, the recess in the hook H will be engaged by the pin on the tube, so that the hook is suspended therefrom, and thereafter a hook-like projection will clear the pin on the block. On the gas pressure being again brought to the normal, the hooked projection comes in contact with the pin, and the container B will be suspended as shown in fig. 2, and the gas will pass from the container into the chamber O, and thence, by the outlet P, to the burner.

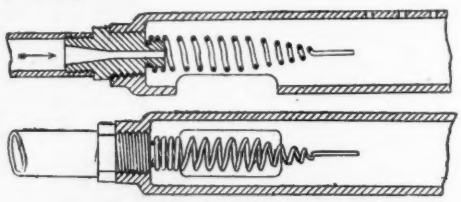
On the pressure being again raised above the normal or working pressure, the container B will be again raised until the inner tank comes in contact with the platform D. At the same time the pin will have passed up the front of the slot in the hook H, and the latter will be thrown off the balance due to the pin engaging the recess, and will assume the position shown in fig. 3, in which position the hook-like projection clears the suspending pin, and the container B will drop down to the position shown in fig. 1, and cause the mercury seal to prevent the gas from passing between the tube and the rod or guide G. The hook H, by coming in contact with the cam L, will be pushed forward; and on the container B being again raised, the pin will engage with the recess.

Preventing Back-Lighting in Atmospheric Gas-Burners.

EHMANN, C. P., of Fallowfield, Manchester.

No. 21,078; Sept. 15, 1909.

This atmospheric gas-burner consists in an "improved special coil device" in the mixing-chambers for preventing back-lighting—"a coil of wire of small diameter fixed to the gas-nozzle and wound rather open; the coil being partly cylindrical with a conical continuation and the end set straight."



Ehmann's Atmospheric Burner.

The device, represented in section and in outside view, consists of a helical coil of wire attached to the gas-nozzle screwed into the mixing-tube. The nozzle is reduced in diameter at its end, and has a groove turned in it. The coil is wound close at the end fitting on to the nozzle; and the first lap is constricted to fit into the groove, while the following laps fit upon the reduced end of the nozzle, to hold the coil in position. The coil is cylindrical for some distance and then tapered; the pitch of the convolutions here decreasing proportionally with the diameter of the coil.

The device is readily applied to existing atmospheric burners as well as to new burners, and is said to prevent back-lighting effectively.

Utilization of the "Waste" of the Purification of Illuminating Gas.

SIMONIN, H., of Pierrefitte (Seine), France.

No. 20,504; Sept. 7, 1909.

This invention relates to the utilizing of the residual products of the purification of illuminating gas ("waste") for the purpose of extracting therefrom nitrogen and sulphur, and of utilizing the materials in the waste, when freed from nitrogen, for the manufacture of sulphurous and sulphuric acids. The process allows, on the one hand, of the production from the waste of nitrogen in the form of sulphate of ammonia or soluble ammoniacal compounds, and, on the other hand, the production either of pure sulphur or of sulphurous acid, by the combustion of the residue when freed from nitrogen, or by its dry distillation with the exclusion of air, without formation of sulphides of calcium or sulphate of lime or sulphite of lime. For the production of nitrogen in the form of soluble ammonia compounds, the process is carried out as follows: The waste is exhausted in a closed vessel in the cold in a diffuser—for instance, by an ammoniacal solution containing about 10 per cent. of commercial ammonia (liquid volatile alkali of 22 Beaumé) corresponding to about 2 per cent. of anhydrous ammonia. By this treatment, all the ammoniacal compounds and cyanogen compounds contained in the waste are rendered soluble. The waste thus exhausted by this ammoniacal solution is then exhausted with ordinary water for the purpose of removing the whole of the soluble products that are retained mechanically in the waste. The ammoniacal and aqueous solutions are placed in a column for distilling ammonia; and after the addition of a caustic milk of lime in calculated quantity for decomposing the resulting ammoniacal compounds, they are subjected to ordinary distillation for the purpose of recovering the ammonia therefrom.

The residue of the distillation now contains the cyanogen compounds, which are converted into ammonia by distillation in the presence of caustic soda and water vapour. The ammoniacal vapours may be recovered, either for the manufacture of volatile alkali or in the form of sulphate of ammonia by passing these vapours through sulphuric acid. The waste exhausted, as described, is then free from its contained nitrogen. It now contains oxide of iron, free sulphur, tars, naphthalene, and, in certain cases, sawdust. It is necessary to free the exhausted waste from the tars and from the naphthalene if it is desired to extract the sulphur therefrom.

In a previous process for the preparation of sulphur and compounds of sulphur from the fouled iron oxide from gas-works, the "waste," with or without a preliminary treatment with acid to dissolve out mineral matter, and after complete or partial drying, is (the patentee explains) heated in a closed vessel, having an exit pipe, to a temperature slightly below the distilling point of sulphur, so as to distil off organic and tarry matter, and then heated to a higher temperature to distil off the sulphur. In another process for treating gas-works residues,

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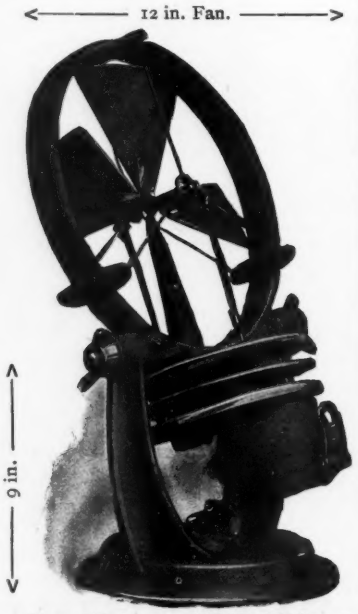

From a Photo.] [*BRITISH MADE.*

J. & W. B. SMITH,

17-23, FARRINGDON ROAD, LONDON, E.C.

the latter were first dried and then distilled in the presence of superheated steam; the tars and naphthalene being driven off before the sulphur began to distil over. In both these processes sulphuretted hydrogen is evolved in considerable quantities; and "as this gas forms an explosive mixture with air, its presence is very dangerous and objectionable in an industrial process."

In the process according to the present invention, water in any form is completely eliminated from the waste in order to prevent the former from reacting in the dry distillation upon the sulphur and oxide of iron so as to form sulphuretted hydrogen and iron sulphides. On the other hand, since this distillation, previous to any distillation of the sulphur, is ended at a temperature of 150° Celsius, the tars and the naphthalene are eliminated during this drying operation, which may be carried up to 200° C. if the waste is derived from the purification of gases from boghead coal for the purpose of eliminating shale oils therefrom.

For this dehydration, use is preferably made of hot air drying apparatus, or of the hot waste gases escaping from furnaces; care being, however, taken to provide a dust-catching chamber in order that no ignited combustible substance shall be able to reach the materials being dried, and cause the sulphur to ignite. The waste thus freed from nitrogen, and dried, is then subjected to ordinary distillation in a closed vessel, for the purpose of recovering pure sulphur therefrom, either in the molten or in the sublimated state—this distillation being effected by the means usually employed for the production of refined sulphur.

If it is then desired to regenerate the oxide of iron contained in the mass which has been freed from sulphur as described, it is sufficient to continue the heating of the distilling retorts while injecting air to burn the woody portions derived from the sawdust that is employed in the purification.

If only the manufacture of sulphurous and sulphuric acids is desired, then the mass, freed from nitrogen and from tar in the manner stated, is treated in the usual manner in a furnace for burning pyrites or for burning sulphur, and the sulphurous acid is either condensed or utilized by ordinary means for the manufacture of sulphurous acids, sulphites, hyposulphites, or sulphuric acids.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Carbonizing Systems—Dr. Geipert's Reply to Mr. Harris.

[TRANSLATION.]

SIR,—Since Mr. Harris, in his letter (*ante*, p. 506), shifts the discussion on to personal grounds, it makes it difficult for me to answer him. That I do so nevertheless is in order to prevent misunderstandings among readers of the "JOURNAL." I have nothing to alter in my earlier remarks; and in regard to Mr. Harris's point, that pressure in the retorts increases the formation of scurf, I can only recommend the perusal of some text-book on the thermo-dynamics of gas reactions. According to accepted theory, the dissociation of substances is not favoured, but is hindered, by pressure. The pressures which occur in retorts are, however, so inconsiderable that they are totally incapable of influencing the primary or secondary phenomena of gasification.

When Mr. Harris emphasizes the difference in the quality of the different descriptions of coal, he certainly refers to a quite well understood fact. His comment, however, does not apply to the case in question. In gas-making trials undertaken to establish the efficiency of a setting, care is taken to use only such coals as are known to be good gas coals. These descriptions of coal, however, generally display such a small difference one from the other in regard to yield of gas that it is quite justifiable to compare the efficiency of the settings, even though the same descriptions of coal were not used in the trials. For the rest, it was far from my intention to conceal anything of Mr. Harris's communication, to the published report of which I expressly drew attention.

The interruptions in the working of the vertical retort-settings mentioned by me certainly referred in some cases only to the letting-down of the settings to a dull red heat, but in most cases to their being cooled-down completely, which may be realized from the fact that in Oberspree we work in the busy season with four settings of vertical retorts, but in the summer with only one setting.

R. GEIPERT.

Mariendorf, Berlin, May 23, 1910.

Burner Maintenance.

SIR,—Further with reference to your remarks about burner maintenance, and realizing the importance of the subject, might I suggest that the Institution of Gas Engineers give an hour for the free discussion of this subject at their first meeting. I think it might be a profitable hour; and the result of it might be the appointment of a Committee to consider the whole question. I feel that the maintenance of the gas industry's position as suppliers of light turns on this question. Hence this letter.

METHOD.

May 28, 1910.

Calorific Values and High Temperatures.

SIR,—In reply to your correspondent's remarks concerning my article on calorific values, I would like to point out that the conclusion stated was arrived at mainly on theoretical grounds, as given. Some general observations were also made, which seemed to support the statement; but no series of graded tests were performed.

While experimenting more recently on the effect of high heats on naphthalene production, some discrepancies were noticed, and several analyses were made. These certainly did not show any regular decrease of methane content with increase of temperature, but were rather irregular.

My attention was first directed to this question by a paper read by Mr. Henry O'Connor in February last before the Scottish Section of the Society of Chemical Industry; and I have undertaken several investigations on the matter with practically negative results.

I should be very grateful indeed to Mr. Edwards if he would kindly give us the benefit of his experience.

G. STANLEY COOPER.

Fowey, May 25, 1910.

Naphthalene v. Choked Ascension Pipes.

SIR,—As I have been one among the many sufferers from naphthalene trouble for some years, I have read most of the papers and articles published on the subject for some time back—including Dr. Harold G. Colman's valuable report. I was, therefore, greatly interested in Mr. G. Stanley Cooper's instructive article on "Naphthalene Formation and Removal," published in your issue of the 24th inst.

My object in writing is to explain a simple and inexpensive experiment which has relieved (if not altogether cured) the trouble. I cut a number of slots in the foul main, 20 inches long by 2½ inches wide, and inserted several screens—keeping each screen a certain distance apart. These screens are inserted where the gas is at a high temperature and are continued in groups at certain distances apart until the gas is reduced in temperature (by travel) to about 100° Fahr. The screens act as scrubbers, and are supplied with light oils and solvents from the crude gas, and thus bring down a great part of the naphthalene, which runs off with the tar.

In regard to choked ascension pipes, I am of opinion that few small works had more trouble than this one. For some years back, 75 per cent. of our ascension pipes were blocked full daily—summer and winter. Every morning they were cleaned out; and a 5-inch rymer passed through each 6-inch pipe, only to find them choked before the following morning. But this has all been changed in a simple manner without any patent appliance or water apparatus, so that for several weeks we have not had one pipe choked and no appearance of anything gathering. The coal used is the same, and the heat of the retorts is equally good, as the make of gas per ton some days reaches over 12,000 cubic feet.

THOS. FRIZELLE.

Holywood, Co. Down, May 26, 1910.

LEGAL INTELLIGENCE.

LIABILITY FOR REINSTATING A ROAD.

HIGH COURT OF JUSTICE—KING'S BENCH DIVISION.

Thursday, May 26.

(*Before the* LORD CHIEF JUSTICE *and Justices* CHANNELL *and* COLERIDGE.)

Metropolitan Water Board v. Bradley.

This was an appeal by the Board from a decision of Mr. Curtis Bennett, one of the Metropolitan Magistrates, by which he convicted the appellants, and fined them £10, for not complying, within 48 hours, with a notice to repair a road which had been injured by the bursting of a water-pipe. The proceedings in the Court below were reported in the "JOURNAL" for Dec. 28 last (p. 895).

Mr. COURTHOPE-MUNRO appeared for the appellants; Mr. MORTON SMITH represented the respondent, Mr. J. W. Bradley, the Engineer and Surveyor to the Corporation of Westminster.

Mr. COURTHOPE-MUNRO said the Board proceeded with the work required to be done, but were two or three days late, owing to the fact that the notice served upon them, which was the first of its kind ever issued, was ambiguous in its terms; and it took the Engineer two days to find out what it meant. When the work was being carried out, the men were stopped by the Westminster Council, who insisted on doing it themselves; and they then summoned, and obtained the conviction. The real point, which arose under the Metropolis Management Act, 1855, was upon whom lay the obligation of repairing the road when it had been damaged by the bursting of a water-pipe, as distinguished from the case of a road opened by the Board for the purpose of laying or repairing a pipe. There was no doubt that in the latter case the obligation lay upon the supplier of water; but by the Act in question the Local Authority had the option, on giving notice, of doing the work themselves, and charging the supplier with the expense. In a case in which the Chelsea Water Company were concerned, it was decided by the Court of Appeal that, in the absence of negligence, there was no liability on them for damage done by the bursting of a water-pipe. In the present case, on the accident being discovered by the appellants, they at once opened the ground, repaired the pipe, filled in the excavation, and gave the proper notice to the Local Authority to make good the surface—specifying the spot and the dimensions of the pavement requiring to be restored. But when the respondent went to view the place, he saw that a much larger portion of the pavement required renewal, owing to injury having been done by the escaping water. In consequence of a previous decision by Mr. Curtis Bennett, that the Local Authority could not recover the cost of a similar replacement when no notice to repair had been served on the Water Board, the Engineer on Saturday, Oct. 30, served a notice on the appellants, requiring them within 48 hours to take up the pavement and well and sufficiently repair and make it good. This was in accordance with section 112 of the Act; and if it had stopped there, it would have been a good notice. But it went on: "Further take notice that the said Council will make good the pavement, &c., instead of permitting such work to be done by the Board, and will charge the Board with the expenses. Please inform me when the Board have broken up or opened the surface, so that I may give the necessary instructions for the pavement or soil to be made good." This being apparently a notice to do something and not to do it, when the Engineer of the Board received it on the following Monday morning he was naturally puzzled, and took it to the solicitor next day. On the Wednesday,

instructions were given to the contractors; and on Thursday the work was commenced. Counsel read the case from which the above facts appeared, and, continuing his argument, submitted, first, that the notice in question was too ambiguous to form the subject of an information; and, secondly, that a notice under section 112 could only be given to repair a pipe, and that when this was served the pipe had already been repaired and the ground filled in. He contended that this was an attempt to combine sections 112 and 114 in one, or to make the penal provision of the former apply to the latter, in which there was no such provision.

After a short argument from Mr. MORTON SMITH in support of the conviction,

The LORD CHIEF JUSTICE gave judgment. After stating the facts and reading the sections cited, he said it was not disputed that nothing was done within 48 hours after the service of the notice; and he could see no reason why section 114 should not be read together with section 112. There was nothing inconsistent in the view that the opening of the road was to be done by the Water Board pursuant to the notice, and that when opened up the Local Authority, if they deemed it expedient, might fill in the ground and make good the pavement. He therefore thought the view taken by the Magistrate was right, and that the appeal must be dismissed with costs.

Justices CHANNELL and COLERIDGE concurred.

AFFAIRS OF THE MID OXFORDSHIRE GAS COMPANY.

In re a Petition of a Debenture Holder.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

Wednesday, May 25.

(*Before Mr. Justice* SWINFEN EADY.)

This was an application by a debenture holder in the Company, who had obtained judgment in the King's Bench Division.

Mr. C. H. CARDEN NOAD, who appeared for the petitioner (Lucy Ann Richards), said there was only the statutory affidavit in support of the petition; and on the previous day—some three weeks out of time—they received an affidavit from the other side which stated that a resolution had been passed for a voluntary winding-up of the Company.

Mr. GALBRAITH said he appeared for unsecured creditors (to the amount of £6720) to oppose the petition.

Mr. NOAD said the principal creditor opposing was Mr. Preston, who was the promoter of the Company, and who claimed to be a creditor for £6000.

Mr. CHRISTOPHER JAMES said he appeared for the Company. There was no doubt that a resolution had been passed for winding-up voluntarily, though it was not strictly proved.

His LORDSHIP asked whether this was the Company in respect of which a Receiver had recently been appointed on behalf of various classes of debenture holders, and if he was the Liquidator.

Mr. JAMES said it was the same Company [see *ante*, p. 446]. The Receiver was not willing to act as Liquidator, and therefore another gentleman was appointed.

Mr. NOAD said he was informed that the Liquidator ultimately appointed was a nominee of Mr. Preston. The meeting was held at Bicester, and there were only two independent shareholders present, one of whom moved the adjournment of the meeting, but was outvoted by shareholders who were officials of the Company. Counsel submitted that he was entitled to an order; but if his Lordship thought the voluntary liquidation, although not proved, ought to be considered, he should ask for an opportunity to adduce evidence of prejudice, for which he had ample material.

Mr. MOSSOP, who appeared for another debenture holder for £2000 to support the petition, said he also could, if necessary, furnish evidence of prejudice.

After some further discussion, the petition was ordered to stand over until the 7th prox., with leave to amend and adduce further evidence.

Additional Capital for the Newport (Mon.) Gas Company.—It will be seen, from an announcement which appears elsewhere, that the Directors of the Newport Company are inviting tenders for an issue of £16,000 of consolidated stock, bearing a maximum dividend of 5 per cent. per annum. It will be offered in lots of £100 each, at a minimum price of £112. Tenders are to be delivered by 10 a.m. on Friday, the 17th of June. As the Company have paid full maximum dividends for upwards of fifty years, it is not likely that the Directors will experience much difficulty in obtaining the additional capital they require for meeting the demands upon their prosperous undertaking.

Meters Limited.—Presiding at the annual meeting in Manchester of Meters Limited, Alderman John Miles said the accounts (*ante*, p. 446) were of a very satisfactory character, particularly when they considered the state of the general trade of the country during the twelve months. They had not increased their output by leaps and bounds; but they had decidedly improved on the previous year. They had not been helped in the matter of the price of the tin and copper used; for while they had had a slight advantage in one, they had had a disadvantage in the other. Prices, therefore, had been practically the same as last year. The good result shown was due to the satisfactory turnover and the excellent management of the works. They took every opportunity of putting down new machines and tools, so that they could produce the very best article possible; experience having shown them that the quality of their manufactures was the best asset the Company could have. It was proposed that £6000 should be placed to the reserve fund, which would then stand at £66,000. They might look hopefully for the continued success of the Company in the coming year. During the two months which had already elapsed, the turnover showed an improvement upon that of the corresponding period of last year. The report was adopted; and dividends at the rate of 5½ per cent. per annum upon the preference shares and of 8 per cent. per annum on the ordinary shares (making the ordinary dividend 6 per cent.) were approved.

MISCELLANEOUS NEWS.

LISBURN GAS-WORKS PURCHASE.

Arbitration Proceedings.

Arbitration proceedings were commenced at the Surveyors' Institution, Great George Street, Westminster, last Thursday, with respect to the purchase of the undertaking of the Lisburn Gas Company, Limited, by the Lisburn Urban District Council. Mr. RAM, K.C., presided as Umpire; and the Arbitrators were Mr. CORBET WOODALL and Mr. H. E. JONES.

The Company were represented by Mr. JOHN GORDON, K.C., M.P., and Mr. CLEASE; and the Council, by Mr. HONORATUS LLOYD, K.C., Mr. VESEY KNOX, K.C., and Mr. C. C. HUTCHINSON.

Mr. GORDON, in opening the case for the Company, described Lisburn as a flourishing town, with a population of something over 11,000; and he said it was a place where the supply of gas was likely to increase. Besides Lisburn itself, the Company also supplied gas in the surrounding district; and the Council had taken powers to supply, not only their own district, but certain outside areas which would roughly correspond to the Company's present limits of supply. The Company was formed in 1837, and till 1857 was carried on as an ordinary partnership concern. Then it was formed into a limited liability Company; and its record was one of continuous prosperity. In 1878, the share capital was fixed at £15,000; and that was as it stood at present—£12,000 being subscribed. From 1882 till 1909, there had been a uniform dividend of 10 per cent. paid, with the exception of about three occasions, when it was a little less. During these 28 years, depreciation to the extent of 2 per cent. had been provided; and, in addition, there had been a very large expenditure on new works and in keeping the old works in a state of efficiency. A reserve fund of over £6000 had been created. The profits had gradually increased; and the number of private consumers had grown considerably. For the last five years, a uniform price of 3s. 4d. per 1000 cubic feet had been charged, and discounts had been allowed. The price previously had been 3s. 6d. These figures compared very favourably with the rates charged in other towns where the gas undertakings were similar. In some places in Ireland the price was as high as 5s. There were only two undertakings supplying at a lower figure than Lisburn; and they were in the hands of local authorities. With regard to leakage, in the last three years the loss had been—17·5 per cent. in 1907, 18·2 per cent. in 1908, and 17·7 per cent. in 1909. This might be considered very excessive leakage; but the Local Authority had been putting down a new sewerage system, and the mains had been affected in consequence. Generally, however, the loss was attributed to a large number of small leaks. The Company's mains were about 13 miles in extent. They had been carefully examined by all parties. Some 28 or 30 borings had been made; and in all cases, with the exception of perhaps three or four, they were found to be good. In one instance, a main was discovered to be quite soft on account of the action of some chemical; but this was found to be purely local. The buildings and plant were sufficient for their purposes; but they were told that some of the plant was not worked as economically as it might be, and that if a little more scientific knowledge were applied the profits could be increased. But the works were in good order. They were a non-statutory Company, and had lived a most harmonious life with the Local Authority in Lisburn, with the exception of the last two years, when the question of purchase arose. There could be no complaint about the gas. In the Act obtained by the Local Authority, they had a limitation of 4s. per 1000 cubic feet. It had been suggested to him that this was a matter of agreement, and not compulsory purchase; but he could not understand how this question could arise. Two years ago, the Local Authority suggested to the Company that they wished to acquire the concern; and the attitude of the Company from first to last had been that they did not want to sell, and did not think they ought to be compelled to do so.

Mr. *William Cash* gave evidence with regard to the accounts of the Company. He said that during their operations there was money which the Company had chosen to devote to the benefit of the consumers which they might have placed in their pockets. Considerable sums had been put to the reserve fund, amounting in all to £12,125. On one occasion, £2400 was taken out of the fund and added to capital, and on another £73 was taken in order to make the dividend up to 8 per cent. The reserve fund was invested to the extent of £5000. The cash in hand amounted to £2000. There had been a slight decrease in the amount of gas sold.

Cross-examined by Mr. HONORATUS LLOYD, witness said that £4700 represented the whole of the cash that had been brought in as capital other than moneys provided by the consumers. There had been transferred to capital account, either from the reserve fund or the profit and loss account, a sum of £6100. In 1878, the assets of the Company were re-valued and written-up to the extent of £1200; and the share capital was written-up by the same figure. These were the facts; but he did not wish the impression left on the minds of the Court that there was anything improper in them, or that there was not value for the amount in the undertaking. Originally, there were 500 shares of £5 each. These were raised by £2 in 1863, and in 1872 another 100 shares were issued at £12 each. To-day there were 600 shares of £25 each nominal. As the nominal value of the shares had increased, transfers had been made from the reserve or profit and loss account to capital account.

Mr. HONORATUS LLOYD: Out of a sum of £4700, which was the only money ever brought into the undertaking apart from transfers, the Company have paid, with the exception of three years, 10 per cent. on the capital, which would be 20 per cent. in the earlier years, and getting on for 25 per cent. or more in the later years, and laid by a reserve fund the balance of which is over £6000, and accumulated an undivided profit of £4000?

Witness: Yes.

Replying to further questions, witness said the balance carried down

for 1909 was £2374, which was equivalent to 16·7d. per 1000 cubic feet sold; the total reserve fund was now £6000 odd on the nominal capital; and the carry-over was £3700.

Re-examined by Mr. CLEASE, witness stated that he did not know of any complaint against the quality of the gas supplied by the Company; and since 1882 the price charged had been very moderate. However, the shares had been raised, and whether or not they had been increased in value, the 10 per cent. had been maintained, which was not unusual in a company such as this. The undertaking had been very successful, and from a financial point of view was in an extremely strong position.

Mr. CORBET WOODALL: Has the capital of the Company risen at a greater rate than the increase in the business?

Witness: No; I should think the reverse.

Mr. *E. H. Stevenson* was the next witness. He said the buildings connected with the gas-works were mostly of stone. Some of them, he admitted, were a little inconvenient; but so far as the structures themselves were concerned, they were good and substantial. If the works were absolutely modern and well managed, there was no doubt that they could make 40 to 50 per cent. increase in the profit on the present make of gas. There were 56 retorts, two exhausters, four purifiers, and three gasholders of a total capacity of 195,000 cubic feet, which he considered sufficient. The maximum make in 1908 was 216,600 cubic feet. The mains were from 12-inch to 1½-inch. In 1909, the mains were examined at numerous borings; and in one place they found a pipe which had become so soft that it could be cut with a knife or a spade. The pipe was laid under a channel in the road, opposite the entrance to a weaving factory; and it had been damaged by some chemical action. Some openings were made a few yards on either side of the damaged point; and the pipe was there found to be perfectly good. Certain of the pipes which had been in the ground for 15 years were just as though they had been laid yesterday; and he had been told that one pipe was 60 or 70 years old. As pipes, they had not depreciated at all. He was sure that the unaccounted-for gas was due to a large number of small leaks; but the percentage in this case could easily be lowered. In a well-managed undertaking, the unaccounted-for gas should not exceed 6 per cent. They ought to have 25 years' purchase as a non-statutory Company. The undertaking was so well managed that he could not conceive it making less profit than at present; but he could conceive the making of a very much higher profit from the same quantity of gas sold. Local authorities made a great mistake when they thought they were going to acquire undertakings such as this, on a non-statutory basis, at a cheaper rate than if they had first had their capital regularized. His valuation of the undertaking was £63,235. The balance of profit earned in 1909 was £2374, and the maintainable profit £2210.

Mr. HONORATUS LLOYD: That will give the Company £1800 per million. Is that reasonable?

Witness: Yes.

If you have your way, the Company will receive £63,235 for the works?—Yes.

They would be entitled to the cash they have, the undivided balance, and the reserve fund; and they would have in their pockets some £74,000?—Yes.

And they have found out of their own pockets something under £5000?—That is entirely wrong. They have found out of their own pockets every penny that has been expended upon the undertaking. They found it so profitable that they put further money into the concern that they might have placed in their pockets.

In respect of the £5000, which is all the shareholders ever risked, they would receive £74,000?—Yes.

So they would receive 1380 per cent. for the money they risked?—Yes, money which they originally risked about eighty years ago. I do not consider that is at all exorbitant, taking into consideration the number of years, and that the shareholders have always been putting their profits into the business.

These people have now for years been only receiving something like 25 per cent.?—I think they have been exceedingly reasonable.

If they get what you ask, they could put it into the Dublin Gas Company, and get an income of £4400 a year on it?—I should not advise it.

Replying to further questions, witness said that if the Council had not bought them up, their future would probably have been that of a statutory Company. He generally advised his clients to obtain statutory powers, because he considered it more satisfactory to all parties. A fixity of tenure would give them a slightly better secured income; but the number of years' purchase depended upon the circumstances of each case.

Mr. HONORATUS LLOYD: The future you have valued on is the future of remaining a non-statutory Company?

Witness: The probability is that we should become a statutory Company, and that might have been very good or very bad for us. We cannot value a thing on problematical conditions of which we have no knowledge.

Continuing, witness said there were certain shortcomings in the works; and some of the plant was slightly deficient. The standard price had always been fixed, upon opposition, with reference to what the gas could be supplied at—that was, the cost of the gas under proper management, *plus* the dividend required.

Second Day.

Mr. *Stevenson*, continuing his evidence on Friday, said that when gas companies nowadays asked Parliament for further capital powers it was generally for £750 per million cubic feet of gas—the figure varied between £150 and £850; £750 being the average. This was more than they used to ask for, because if all the work of the gas undertaking was done out of capital it was most costly, in consequence of providing materials and so on. The general rule was to provide for some of it, if not all, out of revenue. In this case, he would certainly have asked Parliament for £850 per million.

A question arose at this point with reference to the correspondence between the parties; Mr. Gordon pointing out that it was without prejudice. Mr. Honoratus Lloyd read a letter from the Company to the Council, in which the Company said they had not thought of selling; being perfectly content with the position of affairs. If the Council, however, thought it would be for the interest of the town that the works should be acquired, any proposal would be considered by the Board. He also read another letter in which the Company said the Directors could not see their way to make any proposal for the sale of the works; but if the Council decided to buy, and a price could not be amicably agreed upon, they would suggest that the whole matter be referred to arbitration.

Mr. HONORATUS LLOYD: It has been said that the shareholders might have taken out of the Company certain profit instead of putting a large portion to reserve, and re-invested it in the Company; but before re-investing it, they would have declared not a 10 per cent., but a 20 per cent. dividend?

Witness: I do not think they would have done that.

Continuing, witness said that if they had done this from time to time in building up the undertaking, they would not have divided much of a bonus, because the profits would not admit of a bonus, nor even of more than about 7 per cent. on the capital itself. The Company had been depreciating capital year by year, as well as adding to it.

Mr. HONORATUS LLOYD: If the real facts had been appreciated by the consumers, they would not have stood it for five minutes; and one of the reasons why the position was not appreciated is by reason of the fact that you declare a dividend of 8 per cent. and a bonus.

Witness: The consumers in the town get gas at as low a price as any company is supplying in the whole district in the north of Ireland, even including large companies.

Replying to further questions, witness agreed that if the Company were under Statute of any sort all matters would be properly regulated, and the consumer would be so much the better off.

Mr. HONORATUS LLOYD read a report prepared by Mr. Brodie, the Manager of the Gas-Works, from which it appeared that the works as a whole were in a manner commodious, but required reconstructing. With regard to the retort-house, the settings wanted rebuilding in order to obtain the most economic result. The condensers, scrubbers, purifiers, and station meters were all very deficient in capacity. Roughly speaking, the works were worth from £35,000 to £40,000.

Witness pointed out that since that report was written the retorts had been very materially improved. If the retorts gave better results, they would have bigger profits. He did not know that some of the retorts were 22 in. by 15 in., with mouthpieces 18 in. by 13 in.; and he did not know that the hydraulic mains were of cast iron, and much too small. He agreed that the purifying plant was not sufficient in area. The station-governors were not laid down with the object of passing as much gas as could be pushed through them. The works were never built to anything approximating what was shown by the capital account.

In re-examination by Mr. GORDON, witness said that had this been a statutory company he would have fixed the number of years purchase at 28.

Mr. GORDON: The Company have capital fully paid-up of £12,000, and the capital expenditure on works is about £30,000. How do you think that the Company would be treated if they were to go before Parliament?

Witness: I think in the case of a company who were supplying gas as cheaply as this one is, and against whom practically no complaints have been made, Parliament would grant them £12,000 as original capital and 10 per cent. upon it, and the balance at 5 per cent.

Continuing, witness said that if the Company had in times past found the capital out of their own pockets, and it had been put into capital account, there would have been no reduction in the price of gas. A fair average profit made by gas companies in the whole kingdom ranged between 8d. and 2s. 6d. per 1000 cubic feet. There could never have been any real concealment of the profits made by the Lisburn Gas Company, because some of the members of the Local Authority were shareholders.

Mr. JONES: Do you think Irish companies would give as low a return for investment as an English company of the same standing?

Witness: I think it would be about the same; but it is very difficult to find one in Ireland of the same standing.

Have you ever known them to be 1 per cent. more than the same class of English companies?—I believe that, even with the questionable management one sees in most of the Irish undertakings, there is not 1 per cent. difference; and if they were managed as well as the English companies, there would be little, if any, difference. But most of the companies over there are not well managed.

Mr. *J. Hepworth* gave evidence generally bearing out that adduced by Mr. Stevenson. His total structural valuation, which he had based on the profits for 1909, was £28,048. He also agreed that gas management in Ireland was out of date.

This closed the case for the Company.

Mr. *Frank Jones* then gave evidence on behalf of the Council. He said the works were conveniently situated for the purpose of manufacturing gas. There was no doubt that the position of the non-statutory company had depreciated very much in recent years; and this was especially so in Ireland. He had examined the works; and his valuation amounted to £20,513. Describing the condition of the works, he said the exhausters and purifiers were in very bad order, the condenser was too small, and in many cases the service-pipes were too small. He agreed that, so far as the leakage was concerned, it was due to a large number of small leaks. If the Company had not been bought up by the Council, their future would have been that of a statutory company; and he had taken this into consideration in making his valuation. Considering the state of affairs with regard to finances, he thought the consumers, had they known what the state of affairs was, would never have allowed the Company to continue; and if the District Council had known, he thought that they would have stopped it. Sufficient money had not been spent upon the works to keep them in proper repair. Instead of spending £5500 in this direction, it had been placed to reserve.

In cross-examination by Mr. GORDON, witness said the works had not cost more than £11,982, unless the money had been wasted; and the value of the mains and land brought the total up to £21,000. The daily make of gas was, roughly, 240,000 cubic feet, and the gasholder capacity 195,000 feet. If another holder were erected in connection

with the works, he thought the cost would be £30 per 1000 cubic feet, because they would probably have to buy land for the purpose. Generally speaking, the pipes were in good order; but many of them would have to be replaced. He would not put the Company on anything like as high a plane as a good class English company. In the case of a statutory company earning a profit such as the Lisburn Company did, he would give 19 years' purchase. But non-statutory companies in Ireland had been having a pretty "rocky" time of it.

Mr. GORDON: So far as the shareholder is concerned, it is wholly immaterial to me whether I take the dividend out and put it in the bank for six months and then hand it over to the Company and get shares for it. But assume that they made a net profit of £2200 a year, what would that pay them, supposing they divide it?

Witness: Ten per cent. But I do not think Parliament would have given them £21,000 at 10 per cent.

Continuing, witness said that, on the assumption that there was no question of Statute, and that the Company could go on as in the past and conduct their affairs as a private business, the most that they could take out of it would be about £1500 a year, including reserve, insurance, and all the proper funds.

In re-examination by Mr. HONORATUS LLOYD, witness said his chief complaint with regard to the retorts was as to the ironwork itself. The fires were bad, and the make of gas was small compared with the material used. If the works remained in their present condition, they could not continue to earn their present income. The Company would not have been allowed to continue as they were for long, because the Council would have looked upon it as a scandal, and either the price of gas would have had to be substantially reduced, or the Council would have gone to Parliament.

Mr. GORDON pointed out that the Solicitor to the Council was a Director of the Company, and another member of the Council was a shareholder.

Third Day.

Mr. *William Newbigging* gave evidence on Saturday. He said that, so far as the works were concerned, there were deficiencies at practically every stage from the retort-house to the holders. With regard to the retorts, the deficiency was principally with the hydraulic mains, which were of such a character that he was satisfied there must be trouble with them. The condensers were seriously deficient; and the exhausting plant was not in duplicate, as it should be. The scrubbing and washing plant was deficient; and the latter was quite unequal to its work. A new station-meter was required. The maximum day's make was 228,000 cubic feet; and the storage capacity was less by 30,000 cubic feet. The system of governing only existed by day; at night the governors were weighted down. There was a pressure on the mains at night of something like 4¼ inches, which was due to the smallness of the distributing mains. Owing to the smallness of the distributing mains, the governors were put out of action. He considered that the 3-inch mains to the extent of 7264 yards ought to be taken up and replaced. They were too small. His opinion was that the Company had starved the concern. With regard to repairs and maintenance, there should be expended, on an average, 7d. per 1000 cubic feet, which, in the case of Lisburn, was a reasonable figure. This meant that the Company should have spent, including meters and stoves, £995, instead of £592—the figure which appeared in the accounts. It was not his experience that small companies had to pay more for repairs than large ones. The Lisburn Company were very largely dependent upon the sale of coke to balance the profit. In this connection, the receipts for coke in 1909 were £2478. He had valued the undertaking upon the basis of a statutory company, which was its only possible future. His structural valuation was £20,284, included in which was an item of £635 for land, which would have to be deducted. He believed that the fixing of the standard price would have been at a lower figure than 3s. 4d.

In cross-examination by Mr. GORDON, witness said that a sum of £5500 should be spent upon the works in order to make them thoroughly efficient. This would have to be expended to ensure a satisfactory supply. Under the present condition of the works and mains, it was absolutely impossible to give a satisfactory supply.

Mr. GORDON: Do you agree that the expenditure of £5500 will be remunerative in the sense of creating new profit?

Witness: I agree that a portion of this expenditure will tend to increase the profits. But the expenditure on the works is solely for the purpose of ensuring a safe and satisfactory supply.

Do you say there can be no profit unless this sum is expended?—You would run a grave risk of losing the balance of profit. Unless the money is expended, you would not be able to carry on the works; and owing to the condition of the apparatus, you may at any time have an accident.

Replying to further questions, witness said they would not have to stop unless there was an accident; but owing to the state of the plant, the management had already experienced great anxiety. He agreed that the makers of the retorts were good, substantial firms.

Mr. GORDON: At the expense of this selling Company, you want a perfect plant?

Witness: I will not say "perfect."

But you would have it in a highly satisfactory condition?—In a satisfactory condition.

Continuing, witness said he would have the plant in such a condition that they could maintain whatever profits there might be. His opinion was that 19 years' purchase should be given for a statutory company, and 16⅔ years for a non-statutory company. Statutory companies in Ireland were in a worse position than statutory companies in England. The point certainly came within the limits of these proceedings that the people interested in the Lisburn undertaking could take the money they got for their shares and invest it in an equally good company.

Mr. GORDON: First of all you assume that this is a statutory Company? Then you assume that the selling Company should expend a certain sum of money which would ensure its profits?

Witness: Yes.

Thirdly, you say that these profits should be in no way taken into account in arriving at the value of the undertaking?—Not under the circumstances of this case.

Fourthly, an Irish company cannot get money for doing its work on the same principle that an English company can?—That is so.

You ignore the fact that this Company has practically £10,000 of available cash?—Yes, I ignore that.

And if you can find out any gas company in which you can get 5 or 6 per cent. for your money, you ought not to give these people anything more than would produce that income?—I take the market value of gas undertakings as the basis on which I have valued this undertaking.

Re-examined by Mr. HONORATUS LLOYD, witness said he did not mean that all companies ought to spend 7d. every year on repairs and maintenance, but that an amount should be spent which represented 7d. per 1000 cubic feet, taking one year with another over the average life of the works.

Replying to Mr. CORBET WOODALL, witness said he had heard complaints from residents in Lisburn as to the unsatisfactory pressure of the gas.

The UMPIRE: Apart altogether from any increased outlay on repairs and improvement, the new management of the existing works would produce better results?

Witness: Yes.

If the £5500 you suggest were expended, and supposing there was no question of purchase, would this expenditure have enabled the Company to go on as in the past as to the amount of profit they have realized?—No. They could not have maintained their present balance of profit.

Would the expenditure of £5500 enable them to give a satisfactory supply to the district?—Yes.

And given a satisfactory supply, the profit would take care of itself?—Yes.

Mr. H. E. JONES: You do not suggest that the expenditure of £5500 will turn this into a first-class gas company?

Witness: No.

Do you consider the plant can go on doing its work without being entirely reconstructed?—To make a first-class gas undertaking of this concern, it must be entirely reconstructed.

The hearing was adjourned till June 11.

MANCHESTER GAS PROFITS.

Allocation in Aid of the Rates—Unfair Competition of the Electricity Committee.

At a Special Meeting held last Wednesday to deal with the estimates for the current year, the Manchester City Council rejected, without a division, a proposal that the Gas Committee should be called upon to contribute £60,000 instead of £46,500 in aid of the rates. Originally the Committee proposed to allocate a sum of £40,000 out of the profits; but, in response to an urgent appeal from the Finance Committee, they agreed to increase the amount to £46,500, so that there might be no advance in the rates for the year. Now, Alderman Wainwright moved an amendment that a further £13,500 should be taken from the Gas Department, and Mr. Hargreaves seconded it.

The Chairman of the Gas Committee (Alderman Gibson) made a vigorous protest against this attempt to further squeeze his department. He said Alderman Wainwright had not shown how the extra money was to be found by the Gas Committee—assuming apparently that the Committee had some source where they could dig up money as miners dug up coal. It was true that the Gas Department had allocated as much as £70,000 in one year in relief of rates; but this was a solitary case, and must be taken as a proof that they had never been appealed to for a contribution which was not readily made if it could be done. The position was different to-day; and the Committee felt that £40,000 was as much as they could give this year. They had estimated to make a profit of £32,000, but hoped to make more. In response to an urgent appeal, they agreed to increase the contribution from £40,000 to £46,500, in opposition to their judgment as business men; and by doing so they ran the risk of having to find money somehow with which to make up the contribution. He reminded the Council that last year they made £48,000 profit, but paid in aid of rates £50,000—being thus £2000 on the wrong side; and that during the seventeen years he had been Chairman of the Committee, £851,000 had been handed over out of profits in relief of the rates. They were now faced with the keen and unfair competition of the Electricity Committee; and to be asked for an additional £13,500 was absurd. The Electricity Department was slowly murdering the Gas Department; and he was determined not to allow this to be accomplished quietly.

As already stated, the amendment was rejected, so that the contribution from the Gas Department will be £46,500, compared with £50,000 last year. An amendment to the effect that the Electricity Committee be called upon for £20,000, instead of £15,000, as proposed by them, was also defeated, although a strong case was made out by Alderman Holt, the ex-Lord Mayor, who moved the amendment. He said his object was to bring the Electricity Committee into line with the Gas Committee. He argued that the policy of the former Committee had been to sell current practically at cost price. This was all very well; but if they were to allow the Electricity Committee to do this, why should they not permit the Gas Committee to do it? The Electricity Committee were supplying at the average price of 1·30d. per unit current which cost, on an average, 1·27d. to produce, which left only 0·03d. per unit. There were cases, he believed, where the current was supplied at less than cost price. This was affecting the Gas Department; and it was his point that no ordinary business firm would allow two departments of their business to so compete, as was the case here. The time had come when they must make up their minds whether or not to allow the Electricity Committee to continue this policy. It was not fair that the ratepayers should pay £2,500,000 for the benefit of about 9000 well-to-do consumers. He knew all the arguments about a day-load being necessary; but if the Committee did not take care, they would have so much day-load that they would lose the night-load. If the machinery of the department was not fully employed, how was it the Committee were increasing their capital account? He was in favour of a reduction in price, but not to the point where

profit vanished. Incidentally, Alderman Holt mentioned that a conference was to be held between the officials of the two departments to consider the question of fixing prices on an equitable basis.

The net result of the further squeezing of the trading departments and a cutting-down of the estimates is that the rates will be 6s. 9¼d. in the pound—a decrease roughly of ½d. on last year.

SALFORD CORPORATION GAS SUPPLY.

Important Alterations in Price Suggested.

The Gas Committee of the Salford Corporation propose to make several changes in the charges for gas. In the first place they will ask the Council to-morrow to authorize them once more to charge meter-rents, after doing without these charges for nearly seventeen years. Then the quantity of gas allowed for 1d. by prepayment meters is to be reduced from 30 to 27 cubic feet. On the other hand, it is proposed to lower the prices to large consumers of gas both within and outside the borough—1d. per 1000 cubic feet for consumers of 2 millions and under 4 millions, and 2d., 3d., 4d., and 5d. per 1000 cubic feet to consumers of larger quantities, in proportion to the amount used.

BIRMINGHAM GAS, WATER, AND ELECTRICITY SUPPLIES.

The Past Year's Results—Mr. R. S. Hilton Appointed Gas Secretary and Manager.

A Meeting of the Birmingham City Council was held last Tuesday, when the annual reports of the various trading departments (*ante*, pp. 449, 511) came up for consideration. Alderman Bowater, the Lord Mayor, presided.

A New Secretary and Manager for the Gas Department.

Alderman Sir Hallewell Rogers presented the report of the Gas Committee, together with the balance-sheet and statement of accounts for the year ended March 31, and moved the adoption of a recommendation that Mr. R. S. Hilton be appointed Secretary and Manager of the department at a salary of £1500 per annum, rising to £1600 on the completion of one year's service. He reminded the Council that at the meeting on Feb. 1 last, the Committee were authorized to submit for approval the name of a gentleman to occupy the position. Since then, they had given much time and anxious deliberation in their endeavour to secure the services of a thoroughly competent commercial man. They did not advertise the vacancy; and he had no reason to believe they would have received any more favourable applications than they had by so doing. He was equally sure that many of the gentlemen who had made application, including Mr. Hilton himself, would not have answered an advertisement. As a matter of fact, the vacancy was widely known, through the technical journals, in the gas world, in local industrial circles, and generally in the engineering profession. Applications were received, not only from all quarters of the United Kingdom, but from the United States and South America. Last February he outlined to the Committee the qualifications they thought applicants should possess, and stated it was not their intention to interfere in any way with the engineering side of the department. The Committee had every confidence in their Engineers' working, as they were, in charge of their own works. He thought the balance-sheets for the past two years showed that the arrangements for the management of the undertaking entered into on the retirement of the Engineer-in-Chief (Mr. Henry Hack) had proved eminently satisfactory. All that was wanted now was a thoroughly capable business man. The difficulty of finding a suitable man for the post was evidenced by the fact that practically all the principal gas undertakings throughout the country were primarily under the control of an Engineer-in-Chief. The Committee sought the advice of several leading men in the gas industry; and their choice had fallen unanimously upon Mr. R. S. Hilton, Manager of the Clay Cross Company's Collieries at Chesterfield. Mr. Hilton had been General Manager at these extensive collieries for the past five years, and had had to sell the output of coal, amounting to 800,000 tons per annum, and also 75,000 tons of coke, in addition to coke breeze. The Clay Cross coal was largely used for gas-making; and the greater part of the coke was made in bye-product ovens, the recovery plants in connection with which yielded sulphate of ammonia and tar, with the disposal of which Mr. Hilton had also had to deal. He had further had to deal with all mechanical questions at the pits; and large extensions had taken place under his control. The collieries employed over 3000 men; and all questions of magnitude connected with their control had been dealt with by Mr. Hilton. His knowledge of the coal trade would be of considerable assistance to them, seeing that the Committee purchased about 600,000 tons of coal per annum. But, apart from this, the Committee were impressed with Mr. Hilton. After interviews with him, they came to the conclusion that he was a capable business man, and that his engineering and general business knowledge fitted him for the position of Manager of the department. Testimonials received from those who had known him, both privately the whole of his life and in business, proved him a thoroughly straightforward gentleman. With regard to the salary proposed, it might be thought by some members of the Council that the Committee were endeavouring to force their opinions as to adequate remuneration for the position, and that, because the Council refused to approve their recommendation of an increase from £1400 to £1600 for the late Secretary, they were not justified in submitting the name of a gentleman with a commencing salary of £1500. The Council would remember they asked to be given a free hand in the matter of salary; and they did so because they did not think it wise to fix a definite figure without knowing what applications they would receive. Had he been pressed at the February meeting of the Council to name a figure, he would probably have said they hoped to secure the services of a gentleman at about £1250, or within £200 or £300 on either side of this sum. He might say they received applications from men receiving £350 and upwards. Mr. Hilton was already receiving £1400 a year; and, naturally, he would not give up his present position unless he obtained an advantage. It would thus be seen that they could not secure Mr. Hilton's services for a lower sum. He wished it to be understood clearly that, while they were not looking out for a man at this figure, it was the figure at which the only really good man who presented himself was to be had.

Alderman J. H. Lloyd having seconded the motion,

Mr. Pentland moved that the recommendation be referred back. He said he had in mind the present position of the city in regard to trade; and in his view they were taking a step in the wrong direction to the interests of the ratepayers.

The amendment was not seconded; and, on a vote being taken, all but Mr. Pentland voted for the motion, which was declared carried.

Gas Profits.

Alderman Sir Hallewell Rogers then moved the adoption of the Gas Committee's report. He said the figures in the balance-sheet were very satisfactory, as they constituted another record. The gross profit was £189,934. The turnover was £940,000, which was £4823 more than in the preceding year. It might be remarked that in giving £72,491 as a cash contribution to the rates, they were doing so at the expense of the consumers. He would like to point out, however, that had the price of gas been the same as in 1908, their turnover would have been £45,000 more. The output had been increased by 228,000,000 cubic feet compared with the previous year. During the year, 8000 new consumers had been added. It would be seen that the £189,000 was taken over in the profit and loss account, and, after the necessary charges were made, was brought down to £72,491. The good profits for the year were due to various causes. In the first place, the late Mr. Hampton Barber bought his coal exceedingly well twelve months ago. Then the Engineers at the works had got the best out of the coal, and every member of the staff had worked excellently.

The report was approved.

Water-Works Deficiency.

Alderman Beale presented the report of the Water Committee, with the accounts and balance-sheet for the year ended March 31, 1910. Dealing with the accounts, he said no doubt the report would be received with some disappointment. The story was a very simple one. The fact was that the stagnation in the demand for water still remained. There was a slight increase; but it was abnormally small. The total increase was 1·78 per cent.; and if they excluded Coventry—which for the purpose of comparison with previous years ought to be excluded—the increase was something less than 1 per cent. Domestic rental had increased 1·59 per cent. This was naturally low because the stagnation in trade had stopped enterprise in house building. The metered supplies showed a reduction of 0·55 per cent. The Council were about to receive a report from the Electric Supply Department, which showed a largely increased output. He would point out that an increase in the electric output meant, in a great measure, the substitution of electric for steam power; and this resulted in a decreased demand for water. About 11 per cent. of the gross receipts was paid away in rates and taxes. This amount was, of course, spread all over the aqueduct—over all the parishes from Wales to Birmingham. A new item came into charge this year for the first time—the sinking fund for the Welsh capital. They were allowed a period of grace by Parliament. This had now expired; and the charge relating to the loans raised sixteen years ago came in. Next year further amounts would come into charge. The Committee recommended that provision should be made for a contribution from the borough fund and rate account of £65,000. It was a question whether they ought not to ask for more. If they did not do better next year than this, they would have to ask for a supplementary grant; but they did not want to ask more from the rates until they were absolutely obliged. There was an important paragraph in the report giving the total cost of the first instalment of the Elan supply works. When Sir Thomas Martineau presented the report to the Council on which the water scheme was sanctioned in 1892, he had before him only the parliamentary estimate. Looking back on it all, and knowing the magnitude of the work and what had happened, how they ever relied on the parliamentary estimate was a marvel to him. It was simply a rule-of-thumb method adopted by engineers to satisfy the requirements of Parliament. When they encountered underground conditions, and met with extraordinary difficulties in carrying out the work, they soon realized that the parliamentary estimate was of no value whatever for a financial forecast. It was not until 1902 that the late Alderman Parker was able to tell the Council what he thought the ultimate cost would be. The work was now complete; and he was glad to say the cost was £72,344 below the estimate.

Mr. Murray suggested that afforestation of some of the hillsides of the Welsh estates might result in eventually increasing the revenues of the department. Something had been done in this direction; but he saw no mention of it in the report.

Sir G. H. Kenrick said that if they grouped the trading committees, it would be found that the increased profit which they reported came to £4704; whereas the extra deficiency on the Water Department was £4823. It would be seen that there was a large increase in the consumption of water—equal to about 6 per cent. in the domestic supply. As this was not represented by a corresponding increase in the revenue under this head, it meant that the consumers were now using a greater quantity of water.

Alderman Beale, in reply, said that the trees which had been planted on the watershed were growing satisfactorily; but it would be a long time before there would be any revenue.

The report was adopted.

Progress in Electricity Supply.

Mr. Ellaway submitted the report of the Electric Supply Committee, and moved that authority should be given for the provision of additional plant, and the provision of a sub-station at Harborne at a total estimated cost of £143,250. He explained that the last vote for extensions for prospective increase of output was made in 1907, and was expected to meet requirements for the three succeeding years. The output had been growing by leaps and bounds for lighting and power

purposes. The increase of units for lighting and power in 1907 was 1¾ millions, in the following year it was 2½ millions, in 1909 3 millions, and last year 4½ millions. Altogether the forecast of the Committee had been very satisfactorily exceeded. While their capital had been increased by about 15 per cent., the output had increased about 50 per cent.; and during the three years 1908-10, they would, if that day's accounts were passed, have paid £20,000 to the rates, besides £16,000 to the renewals fund, and £62,000 for writing off obsolete plant. They had also made concessions to consumers, in reduced charges, equal to about £11,000.

The report of the Committee, including accounts showing a surplus of £10,255 to be carried to the improvement rate, was approved.

NOTTINGHAM CORPORATION GAS UNDERTAKING.

Gas Profits Relieve the Rates.

At the Meeting of the Nottingham City Council on Monday last week, the Chairman of the Finance Committee (Mr. E. Mellor) submitted the Budget. He first pointed out where the estimates presented last year had been exceeded, and then came to the estimated receipts for the coming year. Referring to the gas undertaking, he said he could speak of it with unmitigated pleasure. A few years ago it was in a state of disorder. There was a divided Committee, and complaints were made from customers as to the quality of the gas—a general position which, to say the least of it, was unsatisfactory. But during the last three years the Mayor and his Committee had brought about a very great improvement. Twelve months ago, a reduction was made in connection with the slot-meters, which saved the gas consumers between £4000 and £5000 annually. This year the Gas Committee were making the Finance Committee a grant of £35,000 in relief of the rates, as against £31,000 last year; and in addition to this they had put £10,000 out of profits to the ordinary reserve fund, and were again reducing the price of gas to the extent of 2d. per 1000 cubic feet to small consumers and 1d. per 1000 cubic feet to large consumers. He emphasized very strongly the fact that the Committee's contribution was not made at the expense of the stability of the undertaking, for the reserve fund never stood so high as it did now. In 1899, out of a net profit of £25 690, £24,000 was taken in relief of the rates; and in 1910, out of a profit of £54,281, the Finance Committee had only asked for £35,000. The total estimated expenditure for the year was £494,562 (including £99,958 for purposes of education), less receipts of £155,027; leaving a balance of £339,535 to be met by the rates, towards which 6s. 3d. in the pound would produce £339,000.

Sir E. Fraser severely criticized the Budget, which he said professed to be that of the Finance Committee, though it had been amended, and as he thought spoiled, by the Gas Committee. It was for the first time the production of two Committees instead of one. Commenting upon the policy adopted by the Corporation to meet the enhanced expenditure, he said the method they proposed was, he believed, absolutely unjustifiable. They were the proprietors of certain trading concerns, which at different times were granted by Parliament as monopolies; but if they were not careful, and turned a reasonable monopoly into a grinding one, they would have it interfered with or taken away. He believed firmly that public utilities should belong to the people or their representatives, with the condition that the monopolies should be managed so that the benefit might be shared between the ratepayers who find the money and the consumers. What they were doing in Nottingham, in taking practically the whole of the profits in aid of the rates, would be impossible under modern legislation; and whenever they went for more money, the principle now followed by Parliamentary Committees might be applied to them, and their present undisputed control over the profits done away with. The Gas Committee were giving an additional £4000; but the Council must bear in mind that the gas consumers were not necessarily the ratepayers. The reduction in the price of gas would amount to not less than £8000; so that the Committee were denuding their resources by the two sums combined. The concession to the consumers was moderate and reasonable; but he did not think the Committee were able to do both. The undertaking had had a very good year, due to a great extent to the low price of fuel. If the gas-works were to be reconstructed on more economical lines, to produce better results, a huge reserve fund would have to be built up; but should the present course be pursued, they would never see the new gas-works, because they themselves had frustrated the idea by giving away the profits of the undertaking.

Sir J. T. M'Craith expressed his concurrence to a large extent with what had been said by Sir Edward Fraser by way of criticism of the Budget; but at the same time he considered it would have been more helpful if he had indicated in any direct way how a change could be made in the general expenditure. Dealing with Sir Edward's remarks on the gas undertaking, and his statement that the Committee were denuding themselves of all their profits, if he (the speaker) had taken the figures down correctly, there was £19,000 left after the £35,000 handed over for the reduction of the rates; so he thought the Committee were putting a very large sum to the reserve. Sir John went on to point out that when the Chairman of the Finance Committee came into office he was burdened with a heavy loan, and that the Council, by their practices in the past, had saddled them with a debt of £2,500,000 for what, after all, was a lot of unremunerative work, leaving out the loans for gas and electricity. It was plainly their duty not to allow the Committee to spend more than was allocated to them. If they did, then it was their own fault.

In the course of his reply, Mr. Mellor said the decrease in the price of coal last year by no means accounted for the profits made by the Gas Committee. Notwithstanding, the depreciation of property in the centre of the city, the increased ratable value was £11,124. He had not taken this into account in his estimate. They must not harbour the belief that they were all going into bankruptcy. He did not see any reason why there should not be a balance in hand at the end of the year of from £4000 to £6000.

The estimates were then adopted.

WEST BROMWICH GAS UNDERTAKING.

The Past Year's Working.

The Borough Treasurer and Secretary to the Gas Committee of the West Bromwich Corporation (Mr. Thomas Hudson) has presented to the Committee his report for the year ended the 31st of March, which is accompanied by an abstract of the accounts for this period. The report furnishes the following particulars.

The borrowing powers stand at the same amount as at the date of the previous report—viz., £209,309. The loan indebtedness also remains at £136,999, and is equivalent to 8s. 6d. per 1000 cubic feet of gas sold, which is a slight increase compared with the previous year, by reason of the decrease in the quantity of gas sold. In addition to the debt extinguished, there is a sum of £13,672 in the sinking fund, available for further redemption of debt as opportunities arise; and this amount, deducted from the £136,999, leaves a net indebtedness of £123,327—a reduction of £4600 during the year. The capital outlay account has been reduced by £899—the difference between the cost of the abandoned water-gas plant, which has been written off, and that of the new carburetted water-gas plant of a modern type which has been installed in lieu thereof, and which has been defrayed out of the year's revenue. The total amount, therefore, debited to this account to date is £241,066, of which £136,999 is owing to the stockholders.

The total income for the year on revenue account was £55,105—a reduction of £394 compared with the previous year. The sales of gas amounted in the aggregate to £39,344, or a decrease of £1185, entirely due to the reduced consumption by lighting consumers. Mr. Hudson says the decrease is no doubt attributable in a large measure to the adoption of newer and improved appliances for more economical incandescent gas lighting, both by manufacturers and by private consumers. The sales for power purposes, however, show an increase of £155. While there is a decreased income from the sales of gas, there is, on the other hand, an increase of £396 from residual products, by reason of a larger production of coke, tar, and ammoniacal liquor.

The total quantity of gas sold was 321,506,600 cubic feet—a decrease of 7,841,788 cubic feet, or 2·38 per cent., when compared with the previous year. The quantity of gas lost by condensation and leakage was 20,063,400 cubic feet, or 5·78 per cent. The amount sold was equal to 6,818,361 cubic feet per mile of main, or a decrease of 214,577 cubic feet per mile compared with the year 1908-9.

The number of houses in the borough in November last was 15,086; 5569 being supplied with gas through ordinary meters, and 5800 by means of prepayment meters—a total of 11,369. The total number of consumers of all classes at the end of the financial was 11,680, or an increase of 158.

The total expenditure on trading account amounted to £42,736; being £1156 less than in the previous year, consequent upon there being a reduction in the output of gas. The total of the manufacturing costs, including maintenance of works and plant, shows a decrease of £1610. Notwithstanding the reduced output, the profit per 1000 cubic feet of gas sold is higher than before.

The gross trading profit carried to the profit and loss account is £12,369, against £11,608—an increase of £761. This account has been charged with interest on loans and Corporation stock and the proper instalment for the redemption and extinction of the debt, amounting together to £8258; leaving a balance of £4111 as the net profit for the year, compared with £3317 before. The amount of the contract for capital outlay on the new carburetted water-gas plant already referred to—viz., £1778—has been charged against the net profits; and the available balance is consequently reduced to £2333. The balance brought forward to the credit of the profit and loss account at the commencement of the year was £12,785, of which sum £1400 was transferred in aid of the general district rate, and £556 to the credit of the extensions suspense account; leaving a net balance of £10,829, which, with the surplus of £2333 for the past year, makes a total of £13,162 to be carried forward.

Accompanying the report of Mr. Hudson is that of Mr. Harold E. Copp, the Borough Gas Engineer, from which we make the following extracts.

The most important work undertaken during the past year was the installation of a new carburetted water-gas plant, superseding the original Dellwik-Fleischer "blue" water-gas plant. This work was carried out by Messrs. Humphreys and Glasgow in a highly satisfactory manner. The plant consists of a generator, a carburettor for the gasification of oil, a superheater or fixing chamber, and two tar-separators—one of the "Cyclone" type, for extracting tar vapour from the crude gas, and the other for the separation of water from the tar by the action of gravity. The total cost of the installation—viz., £2017—has been borne out of revenue. Owing to the highly efficient manner in which oil is gasified in this plant, it has not been found necessary to use the Peebles oil-gas plant, which was installed in 1907 for the purpose of improving the quality and partially enriching the "blue" water gas as previously manufactured.

The stoking machinery continues to work in a most satisfactory manner. The maintenance of the plant during the past year amounted to 0·88d. per ton of coal carbonized for the discharging-machine, to 0·35d. per ton for the charging-machine, and to 0·20d. for the engine and dynamo—a total of 1·43d., against 1·37d. the previous year. The total cost of carbonizing came to £2044, or 1·41d. per 1000 cubic feet of gas made, compared with £2107, or 1·41d. per 1000 cubic feet of gas made, during the previous year—a figure which will compare favourably with other works of similar size.

The quantity of coal carbonized was 27,370 tons, yielding 312,408,000 cubic feet of gas, or 11,414 cubic feet per ton. This is the highest yield obtained in the history of the undertaking. During the previous year, 27,315 tons of coal were carbonized, yielding 304,316,000 cubic feet of gas, or 11,141 cubic feet per ton. The increase in yield was due to less difficulty experienced with stopped ascension-pipes. The quantity of coke used for the production of water gas was 568 tons,

yielding 34,442,000 cubic feet, of which 4,900,000 cubic feet were "blue" and 29,542,000 cubic feet carburetted water gas. The quantity of oil employed was 52,083 gallons. The cost of water-gas manufacture, including benzol and oil for enrichment, was £1480, or 10·33d. per 1000 cubic feet, compared with 11·20d. for benzolized water gas only during the previous year. The carburetted water gas, as now manufactured, is of much greater value than the benzolized water gas previously made, and more nearly approaches the composition of coal gas. The proportion of water gas was 9·9 per cent., compared with 14·62 per cent. the previous year. The total quantity of gas made was 346,850,000 cubic feet—a decrease of 9,597,000 cubic feet, or 2·7 per cent., compared with the year 1908-9. The total wages at the works amounted to £5750, or 3·98d. per 1000 cubic feet of gas made, against £5684 11s. 6d., or 3·81d. per 1000 cubic feet before. The total manufacturing costs came to £30,337, compared with £31,948, from which it will be seen that the greatest care was constantly exercised throughout the year with a view to the economical production of gas.

The coke produced during the year was 16,484 tons, against 16,971 tons; and 5230 tons were used for manufacturing purposes, compared with 5888 tons. The yield of tar was 10·76 gallons, and of ammoniacal liquor 30·71 gallons per ton of coal carbonized, compared with 10·06 and 29·09 gallons respectively before. The ammonium sulphocyanide recovered amounted to 1·43 lbs. per ton of coal carbonized, compared with 1·40 lbs.

I regret to have to report a further decrease in the sales of gas during the past year, amounting to 7,838,788 cubic feet. This is largely attributable to the indifferent state of trade, and also to the great economies and improvements in the uses of gas which have been effected by many of the large consumers. I am strongly of opinion, however, that the causes of the decrease are of a temporary character. During the past two years, gas undertakings in all parts of the country have suffered either a depression or a decreased rate of progress; but recently issued returns show considerable increases in the sales of gas.

The number of gas-stoves put in during the year was 87, compared with 83 before; and there was a considerable increase in the number of radiators, gas-fires, &c., fixed in comparison with previous years. The number of meters fixed was 418, against 375; and 235 new services were laid and 175 repaired, compared with 250 and 154 respectively. New mains were laid of a total length of 564 yards, against 373 yards in 1908-9; the increased length of mains amounting to 480 yards. The number of public lamps is now 1087, of which 846 have incandescent burners, against 1081, of which 797 were fitted with incandescent burners last year. Breakages of lamps in portions of the borough are so frequent that it has not been found expedient to fix incandescent burners.

LEIGH (LANCS.) GAS AND WATER SUPPLY.

Work of the Past Financial Year.

The Engineer and Manager of the Leigh (Lancs.) Gas and Water Works (Mr. James Gibson) has presented to the Gas and Water Committee his eighth annual report, furnishing particulars in regard to the working of the undertakings under their control in the year ended the 31st of March last.

The total revenue of the gas undertaking was £22,429, and the expenditure £9848; leaving a gross profit of £12,581. Interest and sinking-fund payments required £9533, sums amounting to £387 were expended on capital account, and the balance of £2561 was carried forward. This result was achieved notwithstanding that the revenue was diminished by the reduction of 3d. per 1000 cubic feet in the price of gas from July 1, 1909. In the twelve months covered by the report, 249 houses were provided with penny-in-the-slot fittings at a cost of £241, which was defrayed out of revenue. During the year, 318 new gas-services were laid, and 67 defective ones replaced by new. At the beginning of the year there were on the register 2745 consumers on the ordinary and 4963 on the slot system; but at the end of the year the numbers were 2728 and 5340—showing a decrease of 17 ordinary, and an increase of 377 slot consumers. The total number of both classes on March 31 was 8068; being an increase of 360, or 4·67 per cent. The number of gas-stoves in use on March 31 was 2469, compared with 2445 on March 31, 1909. The number of incandescent public lamps at the end of the year was 426, or an increase of 39, and of ordinary public lamps 366—a decrease of 23. The total number of lamps on March 31 was 792. Of the 426 incandescent lamps, 331 are fitted with single and 95 with double burners.

The total quantity of gas sent out during the year was 149,128,000 cubic feet; being an increase of 3,831,000 cubic feet, or 2·63 per cent. The quantity sold (including public lighting) was 141,719,000, or 3,726,400 cubic feet (2·7 per cent.) more than before. This, Mr. Gibson states, is largely due to the progressive policy of the Committee in fixing slot fittings. During the year, the consumers who have these fittings took 1,906,100 cubic feet of gas, as against 351,100 cubic feet the previous year. At the end of March there were 30 gas-engines connected with the mains; and during the twelve months 2,579,900 cubic feet of gas were sold for power purposes. Of this quantity, 2,006,600 cubic feet were charged for at the reduced power rate, which came into operation on the 1st of July.

The quantity of coal carbonized was 13,270½ tons; and, in addition, 4439 gallons of benzol and 3336 gallons of oil were used. The cost of the raw material delivered was 11s. 3·68d., or 5·42d. less than before. The total bulk of gas produced was 149,329,000 cubic feet, of which 1,890,000 cubic feet were carburetted water gas. The make of coal gas was 11,110 cubic feet per ton; of coke, 10·70 cwt.; of tar, 1·12 cwt.; of ammoniacal liquor, 2·48 cwt.; of sulphate of ammonia, 25·32 lbs., compared with 23·86 lbs. in the previous year.

Mr. Gibson reminds the Committee that the income of the undertaking will be considerably lower in the current year, owing to the reduction in the price of gas for street lighting and to the slot-meter consumers; and he says the expenditure will probably be higher by an advance in the price of coal, by the increased cost of renewals of retorts, and by higher rates and taxes.

With regard to the Water Department, there was a loss of £1295 on the revenue account, compared with £1086 in the year 1908-9. Mr. Gibson says the deficit is the outcome of a steadily increasing consumption of water, due partly to the alteration of dry to water closets, and the conversion of the old system of supply into the new, whereby each consumer can have a separate service-pipe. The quantity of water used is thus increased without raising the revenue. Since no addition to this can be expected from the assessed charges, Mr. Gibson says it will be advisable for the Committee to avail themselves of every possible source of revenue. The total quantity of water received from the Corporations of Liverpool and Manchester during the year was 255,675,000 gallons, of which 3,806,900 gallons were sold in bulk to the Astley Parish Council. Its distribution produced £9638, compared with £9701 in the year 1908-9; the average yield being 9·04d. per 1000 gallons, against 9·26d. before. The total capital invested in the water undertaking up to the 31st of March was £61,937; and the expenditure under the Leigh Corporation Act, 1903, to the same date was £19,746.

The report came before the Committee on Monday last week, and was passed by them.

EVESHAM CORPORATION GAS DEPARTMENT.

Annual Report.

At the last Quarterly Meeting of the Evesham Corporation, the accounts of the Gas Department for the year ended the 31st of March were presented with the minutes of the Gas Committee, before whom they came on the 4th inst. Mr. Fisher, in moving the confirmation of the minutes, said that the total receipts amounted to £9023 net, and the total expenditure to £6535, which left a balance of £2488. The net receipts from the sale of gas were as follows: Public lighting, £401; private lighting, £3627; and prepayment meters, £2354—making a total of £6382, or an increase of £270. The balance of the revenue account was dealt with as follows: A sum of £759 had been written off the several capital accounts for depreciation; instalments of loan and interest absorbed £294; and there was left £1435 to be carried to the profit and loss account. The loan account showed that of the £15,000 borrowed £13,518 had been repaid out of revenue; leaving a balance of only £1482 outstanding. The expenditure for the year in extension of mains and services, new stoves, &c., amounted to £922; and the outlay on new meters came to £178. The stock in hand on March 31, the amounts due for gas, residuals, and fittings, and a credit balance at the bank made a total of £4754. On the other side of the balance-sheet, the amounts due to sundry creditors other than the loan accounts were £1083, which left a balance of £3671. The number of new consumers during the year was 75; and 100 cookers had been fixed. Though he did not expect the consumption of gas to increase so rapidly in the future as it had done in the past few years, the Council would see that they were still steadily progressing. The make of gas for the year was 46 million cubic feet—an increase of 2 million cubic feet. The minutes were adopted.

TIVERTON CORPORATION GAS UNDERTAKING.

The Disposal of the Profits.

Alderman J. Thorne, the Chairman of the Lighting Committee, submitted to the Tiverton Town Council yesterday week the annual statement with reference to the gas undertaking. The Borough Treasurer's report showed that the gross profits amounted to £3089, and that after deducting £2541 for interest and sinking fund there remained a balance of £548 to carry to the reserve fund, which, with this addition, would amount to £3214. New retort-settings on the regenerative principle had been installed during the year at a cost of £1247, of which sum £600 had been charged to capital; the balance being repaid in instalments out of revenue. The amount collected from slot-meters was £2082—an increase of £251 on the previous year. Considerable improvement had been made in the lighting of several of the streets by the adoption of the incandescent system. Alderman Thorne remarked that the statement was a most satisfactory one. The profit of £548 was entirely due to the new plant which had been installed. They had used 350 tons less coal, and had made a million cubic feet more gas. The unaccounted-for gas was lower than ever. It had been as high as 10 per cent. of the total make; but it was now only 4·7 per cent. This was largely due to a new and efficient governor. They all recognized the skill and capacity, as well as the industry, of the Manager (Mr. Clark Jeffery) in the production of such a statement as the one submitted. It had been proposed to carry the balance of £548 to the reserve fund; but the Lighting Committee now suggested that £400 should be applied in the reduction of the rates. Mr. Rowcliffe thought the price of gas should be reduced before the profit was used as proposed; and he moved that there be a reduction of 1d. per 1000 cubic feet. Alderman Thorne said the price of gas at Tiverton compared favourably with that of any town of similar size; and, under the circumstances, the Committee considered they would be justified in making a contribution to the district fund. The Mayor (Alderman W. Thorne) joined in the tribute paid to the ability of Mr. Clark Jeffery, and said they also owed a great deal to the interest which the Chairman of the Lighting Committee took in the financial arrangements of the gas undertaking. The proposal to reduce the price of gas was rejected; and it was decided that £400 of the balance of profit should be utilized in the reduction of the rates.

Gas-Works for Sumner (N.Z.).—H.M. Trade Commissioner for New Zealand reports that the Borough Council of Sumner, a suburb of Christchurch, propose to raise a loan of £12,000 for the purposes of establishing municipal gas-works. If the scheme receives the sanction of the ratepayers, and financial arrangements are made, approximately £9000 will be spent in gas plant and about eight miles of 6 inch to 2-inch cast-iron pipes, &c.

SOUTH AFRICAN LIGHTING ASSOCIATION, LIMITED.

Decrease in Consumption and Municipal Electrical Competition. Views of Gas Engineers.

The Ordinary General Meeting of the Association was held last Wednesday, at the London Offices, No. 90, Cannon Street, E.C.—Sir DANIEL F. GODDARD, M.P., in the chair.

The SECRETARY (Mr. William Cash) read the notice convening the meeting.

The CHAIRMAN, in moving the adoption of the report and accounts, said he regretted he could not give such a report as it had been his good fortune to do in previous years. There were in their business some things which could be controlled, and some things which could not be controlled. They could easily control matters applying to the manufacture of gas—to the various methods of economy and improvement of plant which provided new outlets for profit, and for bringing into use all the most recent developments of science. They could do all this; but unfortunately they could not control trade and its effects, nor could they control the serious competition which had been the main cause of reducing their profits during the year. At the last meeting, he referred to the badness of trade in South Africa; and to the serious competition from the municipal electricity supply. Regarding the first matter, he was happy to say there was no doubt there had been an improvement all round in the condition of trade in Cape Colony. The Company hoped to share in it; and they were doing so already to some little extent. The general commercial conditions having turned the corner, they trusted the improvement would be rapid and continuous. Concerning the competition of the electric light, he was sorry to say he could not make any similar hopeful report. The Company were subjected to the keenest competition; and he did not think it was altogether reasonable competition, because in this case (he was not able to speak with certainty) it could scarcely be possible the Municipality were reaping any advantage from the lowness of the prices at which they were supplying current. He understood it could only be done, at the prices charged, at considerable loss. However that might be, the competition took from the Gas Company their consumers; and this municipal competition (which was bolstered up by the rates) was very difficult to get over. He was sorry to say the Company had lost the custom of the railway, which was a very important customer; and the Post Office had also thrown out gas. These losses had been a heavy blow to them. He also reported last year that the public lighting had been taken over by the Municipality. This was only to be expected with the Municipality running electricity. He feared the Company had not yet quite got to the end of their troubles. At any rate, he preferred not to take too hopeful a view just at present; for although they were operating the concern as well as they possibly could, there was no question this sort of thing was a serious hindrance. That was the bad side of the account; and the other was that they were improving in their methods of manufacture, and were showing economies. In respect of this, it was really very satisfactory to be able to report that the net cost of gas into the holders had been reduced by 3d. per 1000 cubic feet in the year; and this compared with a year that was the previous lowest on record. He hoped this would be taken as showing that the officials of the Association were doing their level-best to meet the case, and to bring the working costs down to the lowest possible point. Of course, the shareholders would realize that working costs, when the output was reduced, naturally rose; and that there must also be an increase in the cost of capital whenever the output was diminished. Up to the present time, they had not materially diminished their maintenance costs, and had kept up the works thoroughly. The Directors considered this was good policy. They were also not without hopes that there were steps that might be taken to effect some reduction in salaries—in fact, in respect to one official who had returned to England, this meant a saving of some hundreds of pounds. If the accounts were looked into carefully, he thought it would be seen that they showed really good working. Coal presented a reduction in cost of £2662 on the year. Part of this was, of course, due to the fact that they had carbonized so much less coal, and also to the fact that coal and freights were cheaper. He was afraid that, in the current year in this particular item, they would not be able to effect any reduction. Coal was now rather dearer; and, although the Directors had done the best they could, there would be a little extra expense in this direction. Then £363 was saved in water gas; and the wages at the works were £295 less. Of course, this was partly due to the less work, and not to any reduction of individual wages. The great drop was in respect of the sale of gas, which had diminished by rather more than 18 per cent.—representing a decrease in money of £4640 at Port Elizabeth, of which he was only speaking at the present time. Then there was a decrease in the rental of meters, which was naturally due to the falling off in the number of consumers. Practically all the working costs had been reduced; but the make of gas per ton of coal had increased from 10,812 to 11,203 cubic feet. This was an excellent result; and it indicated that every care had been taken by their Engineer. Then the Directors and the Manager had sought new outlets for business. Hitherto they had had great difficulty in realizing any profit from their ammonia. It would be remembered that some time ago they put down an ammonia plant for the purpose of turning their ammoniacal liquor into anhydrous ammonia. At the present time, however, there was not much sale for it. But they were able to make a commercial article which was known as cloudy ammonia, for which there was a considerable demand in South Africa. They were hoping for much from this industry. The plant was in thorough working order now; and the sales were constantly increasing. There had also been a great demand for tar. If the Company could have supplied more, they could have made a larger profit on tar than ever before. Not using such a large quantity of coal as usual, they did not make so much tar. But they had been able to send tar from this country, which they had been able to sell, for road purposes and so forth, at good profit in Cape Colony. Concerning the unaccounted-for gas, the percentage was rather heavy. But he believed it was one of those figures that was always illusive. When the amount of gas sold was reduced, the percentage of unaccounted-for gas naturally increased. He (the Chairman) believed the leakage per mile of main to be very favourable indeed as compared with that of any other gas company. But when put into a percentage it was somewhat large—11·8.

Mr. H. E. JONES: It is not large for a place like that.

The CHAIRMAN (proceeding) said with regard to Grahamstown, he could speak with more confidence. Business there was growing; and he thought he might say there was every prospect of a steady increase. Of course, it was a much smaller place than Port Elizabeth. The

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 545.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
1,474,000	Stk.	Apl 1	5	Alliance & Dublin Ord.	82—84	..	5 19 1
310,000	Stk.	Jan. 13	4	Do. 4 p.c. Deb.	100—102	..	3 18 5
200,000	5	May 12	7	Bombay, Ltd.	6⅛—6⅜	..	5 9 10
40,000	5		7	Do. New, £4 paid	4⅜—5⅛	..	5 9 3
50,000	10	Feb. 25	15	Bourne-	29—30	..	5 0 0
311,810	12	,,	7	mouth Gas } B 7 p.c.	16½—16⅝	..	4 3 7
75,000	10	,,	6	and Water } Pref. 6 p.c.	15—15½	..	3 17 5
380,000	Stk.	,,	12½	Brentford Consolidated	251—254	..	4 18 5
300,000	,,	,,	9⅜	Do. New	183—190	..	5 0 0
50,000	,,	Aug. 12	5	Do. 5 p.c. Pref.	120—122	..	4 2 0
206,250	,,	Dec. 29	4	Do. 4 p.c. Deb.	101—103	..	3 17 8
220,000	Stk.	Mar. 16	11	Brighton & Hove Orig.	213—216	..	5 1 0
246,320	,,	,,	8	Do. A Ord. Stk.	152—155	..	5 3 3
460,000	20	Apl. 1	10⅝	British	44—45	..	4 14 8
109,000	Stk.	Feb. 25	6	Bromley, A 5 p.c.	118—120	..	5 0 0
165,700	,,	,,	4½	Do. B 3½ p.c.	88—90	..	5 0 0
82,378	,,	,,	5⅜	Do. C 5 p.c.	105—107	..	5 2 10
51,000	,,	Dec. 29	3⅜	Do. 3½ p.c. Deb.	87—89	..	3 18 8
500,000	10	Oct. 14	7	Buenos Ayres (New) Ltd.	—	..	—
250,000	Stk.	Dec. 29	4	Do. 4 p.c. Deb.	98—100	..	4 0 0
100,000	10	—	—	Cape Town & Dis., Ltd.	4—5	..	—
100,000	10	—	—	Do. 4½ p.c. Pref.	6—7	..	—
50,000	50	May 3	6	Do. 6 p.c. 1st Mort.	49—50	..	6 0 0
100,000	Stk.	Dec. 29	4½	Do. 4½ p.c. Deb. Stk.	87—89	..	5 1 2
157 150	Stk.	Feb. 25	5	Chester 5 p.c. Ord.	103—111	..	4 10 1
1,513,280	Stk.	Feb. 25	5⅛	Commercial 4 p.c. Stk.	106—108	..	4 16 4
560,000	,,	,,	5	Do. 3½ p.c. do.	103—105	..	4 15 3
475,000	,,	Dec. 29	3	Do. 3 p.c. Deb. Stk.	81—83	..	3 12 3
800 000	Stk.	Dec. 10	5	Continental Union, Ltd.	98—100	..	5 0 0
200,000	,,	,,	7	Do. 7 p.c. Pref.	138—140	..	5 0 0
492,2?0	Stk.	—	5⅛	Derby Con. Stk.	121—123	..	4 9 5
55,000	,,	—	4	Do. Deb. Stk.	104—105	..	3 16 2
148,995	,,	Apl.)	5	East Hull 5 p.c. Ord.	96—98	..	5 2 0
486,930	10	Jan. 27	12	European, Ltd.	24¼—24⅝	..	4 17 0
354,060	10	,,	12	Do. £7 10s. paid.	18¼—18⅝	..	4 16 0
16,196,67?	Stk.	Feb. 10	4⅜	Gas } 4 p.c. Ord.	103½—104¼	..	4 9 3
2,600,000	,,	,,	3½	light } 3½ p.c. max.	88—90	..	3 17 9
4,002,235	,,	,,	4	and } 4 p.c. Con. Pref.	104—106	..	3 15 6
4,531,706	,,	Dec. 29	3	Coke } 3 p.c. Con. Deb.	81—83	..	3 12 3
258,740	Stk.	Mar. 16	5	Hastings & St. L. 3½ p.c.	93—95	..	5 5 3
82,500	,,	,,	6½	Do. do. 5 p.c.	117—119	..	5 9 3
70,000	10	Apl. 29	11	Hongkong & China, Ltd.	17—17⅛	..	6 5 9
131,090	Stk.	Mar. 16	7	Ilford A and C	145—147	..	4 15 3
65,780	,,	,,	5⅜	Do. B	108—110	..	5 0 0
65,500	,,	Dec. 29	4	Do. 4 p.c. Deb.	100—102	..	3 18 5

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
4,940,000	Stk.	May 12	8	Imperial Continental	177—179	..	4 9 5
1,235,000	Stk.	Feb 10	3½	Do. 3½ p.c. Deb. Red.	94—96	..	3 12 11
195,242	Stk.	Mar. 16	6	Lea Bridge Ord. 5 p.c.	122—124	..	4 16 9
561,000	Stk.	Feb. 25	10	Liverpool United A.	222—224	..	4 9 3
718,100	,,	,,	7	Do. B	163¾—165¾	..	4 4 7
306,083	,,	Dec. 29	4	Do. Deb. Stk.	103—105	..	3 16 2
75,000	5	Nov. 26	6	Malta & Mediterranean.	4⅜—5	..	6 0 0
560,000	100	Apl. 1	5	Met. of } 5 p.c. Deb.	100—102	..	4 18 0
250,000	100	,,	4½	Melbourne } 4½ p.c. Deb.	100—102	..	4 8 3
541,920	20	May 27	3⅜	Monte Video, Ltd.	12¼—13*	..	5 7 8
1,775,892	Stk.	Feb. 25	5⅜	Newc'tle & G'tesh'd Con	104—106	..	4 2 7
529,435	Stk.	Dec. 29	3½	Do. 3½ p.c. Deb.	91—93	..	3 15 3
55,940	10	Feb. 25	7	North Middlesex 7 p.c.	133—133	..	5 1 10
300,000	Stk.	Apl. 29	8	Oriental, Ltd.	138—140	..	5 14 4
60,000	5	Apl. 1	8	Ottoman, Ltd.	6—6⅛	..	6 8 0
31,800	53	Feb. 25	13	Portsea Island A.	134—136	..	5 1 0
60,000	50	,,	13	Do. B.	126—128	..	5 1 7
100,000	50	,,	12	Do. C.	119—121	..	4 19 2
114,800	50	,,	10	Do. D and E.	100—102	..	4 18 0
398,490	5	Apl. 29	7	Primitiva Ord.	7⅛—7⅜	—⅛	4 13 4
796,980	5	Jan. 27	5	Do. 5 p.c. Pref.	5⅝—5⅞	—⅛	4 13 0
488,900	100	Dec. 1	4	Do. 4 p.c. Deb.	99—101	..	3 19 3
1,000,000	10	Oct. 14	8	River Plate Ord.	—	..	—
312,650	Stk.	Dec. 29	4	Do. 4 p.c. Deb.	99—101	..	3 19 3
250,000	10	Apl. 1	9	San Paulo, Ltd.	15⅛—15⅝	..	5 14 3
62,500	10	,,	6	Do. 6 p.c. Pref.	11⅝—12⅛	..	4 18 0
125,000	50	Jan. 3	5	Do. 5 p.c. Deb.	5⅛—5⅜	..	4 17 1
135,000	Stk.	Mch. 16	10	Sheffield A	232—234	..	4 5 5
209,984	,,	,,	10	Do. B	232—234	..	4 5 5
523,500	,,	,,	10	Do. C	232—234	..	4 5 5
70,000	10	May 27	10	South African	11⅛—12"	..	8 6 8
6,439,895	Stk.	Feb. 10	5/9/4	South Met., 4 p.c. Ord.	120—122	..	4 9 7
1,895,445	,,	Jan. 13	3	Do. 3 p.c. Deb.	80—82	—1	3 13 2
209,820	Stk.	Mar. 16	8	South Shields Con. Stk.	157—158	..	5 1 3
605,000	Stk.	Feb. 25	5⅜	S'th Suburb'n Ord. 5 p.c.	121—123	..	4 12 0
60,000	,,	,,	5	Do. 5 p.c. Pref.	121—123	..	4 1 4
117,058	,,	Jan. 13	5	Do. 5 p.c. Deb. Stk.	122—124	..	4 0 8
502,310	Stk.	May 12	5	Southampton Ord.	110—112	..	4 9 3
120,000	Stk.	Feb. 10	6⅛	Tottenham } A 5 p.c.	133—135	..	5 1 9
453,940	,,	,,	5⅜	and } B 3½ p.c.	113—115	..	4 13 6
149,470	,,	Dec. 29	4	Edmonton } 4 p.c. Deb.	99—101	..	3 19 3
182,380	10	Dec. 29	8	Tuscan, Ltd.	9¼—9⅜	..	8 4 2
149,900	10	Jan. 3	5	Do. 5 p.c. Deb. Red.	99—101	..	4 19 0
236,476	Stk.	Feb. 25	5	Tynemouth, 5 p c max.	113—115	..	4 11 11
255,636	Stk.	Feb. 25	6⅝	Wands- } B 3½ p.c.	139—141	..	4 14 0
79,416	,,	Dec. 29	3	worth } 3 p.c. Deb. Stk.	74—76	..	3 18 11

Prices marked * are "Ex div."

increase in sales was 2 per cent.; the costs were decreasing; and the profits were steadily rising. Indeed, for the first time, they were now realizing in Grahamstown a profit of 10 per cent. on the undertaking. Although they had been paying 10 per cent., taking the two concerns together, this was the first year in which they had realized 10 per cent. on that concern alone. He could not hold out any very great hope of improvement in the fortunes of the Company during the current year; but he was anticipating they would have no further set-back than he had had to report on this occasion, which had resulted unfortunately in having to pay a reduced dividend.

Mr. JAMES MACALISTER seconded the motion.

Mr. H. E. JONES remarked that it was quite clear the Company were suffering from drastic competition, fortified by rates inflicted upon the Company as well as others. They must not, however, despair, but must fight this competition in the only possible successful way. They must if necessary go through hardships, and even, if necessary, forfeit their dividend. But they must beat the competition out of the field. He was accustomed to dealing with gas in different parts of the world; and he invariably found one policy did enable them to beat the competition. An electric undertaking which began to compete with one of his companies had after a time to hold back even the dividend on its debentures. Since then it had been in the hands of the liquidators. It had now been sold to a Company who might make a better show of it. The Gas Company reduced their charges four times; and they were, before the new Company started, going to make a further reduction in price. That was the drastic policy he suggested to the Directors of this Company for application in South Africa. There was very heavy competition with municipal electric lighting in this country. But whatever increase in lighting was to be got out of a district, gas obtained it; and this was done by reducing the price. He ventured to say that the great cause of the falling off in the case of this Company was the price of gas; and if they allowed the business to slip away from them, it would be felt not only in the wear and wear, wages, and maintenance, but in the cost of standing charges. They must not let the standing charges run away with them; but they must increase the sale of gas. The Company would make more profit with gas at 6s. than at 8s.; and they would have to make some heavy reduction like that to do any good. This view was based on a long experience—some thirty years—in the competition with electricity. It had been demonstrated in this country beyond a shadow of a doubt that electricity could not, given equal conditions, be produced in competition with gas. Electricity undertakings had to pay equal prices for coal; and they had no residuals, such as had gas undertakings. The Company had a good market for tar; and ammonia for refrigerating purposes was very valuable. In his opinion, this was an instance where drastic measures would be most effectual.

Mr. ALEX. MITCHELL remarked that 18 per cent. reduction in consumption was something enormous; and apparently the Company had lost some large consumers. He had had some experience of electrical competition; and he felt that nothing the Company could do would bring the lighting back. Some people would have electric light for special purposes. In his own case, they made large reductions not for lighting, but for power to meet the competition in that direction. The trouble of competing against corporations was that if the latter did make a loss, they did not trouble much, as it came out of the ratepayers' pockets. He did not know what relationship the Company's price for gas bore to the price of electricity; but if it was too high, it would have to be reduced. At home the price of gas and electricity had a certain proportion; and it would have to be so in South Africa. He took it their Manager was trying to make up, by heating and cooking, what was an irretrievable loss to electric lighting. They could not crush out electric light; and their business was to push gas for fuel as much as possible. Electricity had only one field; and they would find that people who would have electricity for lighting would not have it for cooking. He instanced an hotel where all the cooking, instead of being done by coal, was now done by gas. The hot-water arrangements utilized coke for heating. The bedrooms were lighted by electricity for convenience; and the public rooms by gas, because it was found the cheaper. The consumption of gas must be increased by every possible means; but it was not to be done by any unreasonable reduction in price. The price must be reasonable, however, to make gas available for every useful purpose besides lighting. At the same time the people of Port Elizabeth should be shown the positive absurdity of the Corporation selling electricity at a loss. He noticed the Directors could have paid a little extra dividend by taking something from the reserve fund; but their safest financial course was the one taken.

Mr. J. B. FERRIER supported the remarks of Mr. Mitchell, and regarded the advice of Mr. Jones as rather too courageous. It was impossible for the Company to meet the competition of the Corporation who had the ratepayers' money behind them. The practical way of recouping lost lighting business was to find means of applying gas for cooking and for power. He was sure the Board had their minds turned in that direction, because they could not compete for lighting purposes with municipal electricity.

Mr. CASH, replying to a query by Mr. SAMUEL WHILE, as to the expenditure for new services, said that for a number of years the Company charged the whole of their new services to revenue. But for the last three years they had charged part of the cost to capital account. The sum had grown from £1287 to £1631.

The CHAIRMAN added that last year they had 843 new connections; but 1170 disconnections.

Mr. CORBET WOODALL said he did not think he had ever heard two more useful speeches at a shareholders' meeting than they had had on this occasion. He shared Mr. Jones's optimism with regard to the future of gas, whether at home or abroad; but he confessed to some doubt as to whether it would be wise to make the severe and heavy reductions in price he recommended. They had brought down the price until it was the lowest in South Africa, though they were not the largest Company; and the Directors and their Manager had considered carefully every method of increasing the outlets for gas beside

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lighting. But he was not by any means disposed to say that the day of gas, even in South Africa or other hot climates, was over for lighting. He believed the Company would get back a considerable amount of that which had been lost. The disadvantage of having two supplies in a house was considerable; and when people needed (as they did) gas for warmth and for cooking, they would also have it for lighting. With regard to the prospects in Port Elizabeth, he was sure Mr. Jones would be the last man to disparage efforts in reducing costs. To these the Directors were giving very careful attention. As the Chairman truly remarked, costs as a rule increased as the business declined; but in this case, they had not done so. On the contrary, the cost of gas per unit of gas sold had been reduced; and he was quite sure they had not reached the end of possible economies in this direction, without diminishing in any sense the efficiency of the supply. They were not going to diminish their expenses in the direction of giving instruction, cookery lectures, show-rooms, and so forth. Then the opening up of business in ammonia, he believed, would be helpful. At Grahamstown, the growth of the profit was eminently satisfactory; and there the Company had the advantage that they had the right to supply electricity as well as gas if a supply was demanded. It was most unfortunate that the Municipality of Port Elizabeth elected at all to enter upon the supply of electricity; it was particularly unfortunate they should have come to the arrangement when they did. They started at a time when Port Elizabeth was under a cloud of depression; and it was perfectly natural they should strain every nerve to get the utmost business they could so as to diminish the loss the town would inevitably sustain. They took over the public lighting at an increased cost to the town, as compared with an equal amount of light from the Gas Company. Altogether the competition of municipalities in matters of this sort was deplorable to a degree; and it could not be dealt with as could ordinary competition upon business lines. The Municipality, having taken the false step of commencing to supply at all, would, as had been mentioned by all those who had spoken, stand at very little in order to get business for their plant. He believed they must be losing heavily by the supply, but that only spurred them to make further efforts to get additional business. With regard to the Post Office and the railway, they were both State institutions; and the connection between State and Municipality was very intimate. The Company had spent a considerable amount of money on the lighting of the Railway Station, and had made of it a great success. Notwithstanding this, and the fact that the gas supply was undoubtedly the cheaper with regard to the amount of light, it had gone. The Company would not cease to hammer away in the hope of getting it back once again, but it would be a hard fight. Looking at the position as a whole, he was not by any means seriously depressed. He thought that, as he had said, they would get back from, rather than lose further to, electricity. The general trade of the country was decidedly improving; and with this improvement, the Company would prosper. While one much regretted the set-back, he personally felt thankful for the long career of prosperity that had attended the Company; and he did not believe they had reached the end of it.

The CHAIRMAN said to show that their officers were doing their very best to introduce all the newest forms of using gas, he might say that nearly 50 per cent. of the consumption at Port Elizabeth in the last half year was used in stoves. As to reductions, there had been no spirit of meanness in connection with them. The smallest reduction ever made was 5d. per 1000 cubic feet; and the Directors had generally gone to 10d. When the Association commenced, the price of gas was 12s. 6d. per 1000 cubic feet; it was now 8s. or 8s. 4d.

The motion was unanimously carried.

Proposed by the CHAIRMAN, and seconded by Mr. HENRY WOODALL, a dividend of 7 per cent. was declared, free of income-tax, and less the interim dividend.

Moved by Mr. ANDREW L. DON, seconded by Mr. H. E. JONES, Sir Daniel Goddard was re-elected to his seat at the Board; and Mr. P. D. Griffiths, F.C.A., was re-appointed Auditor, on the proposal of Mr. G. CRISPE WHITELEY, seconded by Mr. MITCHELL.

On the motion of Mr. JAMES CLOUDESLEY, seconded by Mr. WHITELEY, the thanks of the shareholders were cordially passed to the Chairman and Directors and to the officers—special mention being made of the devoted services of Mr. Arnott.

The CHAIRMAN, in the course of his acknowledgment, said that that morning they had received a message from their Manager informing them that last month they had had the smallest falling off in consumption that they had had for two years. He (the Chairman) did hope they were now turning the corner, and that next month would show a slight increase.

Increased Consumption at Sedgley.—The quantity of gas made at the works of the Sedgley Urban District Council during the year ended March 31 was 32,093,500 cubic feet, as against 30,096,500 cubic feet the previous year—an increase of 1,997,000 cubic feet. The quantity of coal carbonized was 2812 tons, as against 2590 tons; the amount of gas made per ton of coal was 11,413 cubic feet, as against 11,620 cubic feet in the previous year.

Cardiff and the Rhondda Water Bill.—At a meeting of the Cardiff Parliamentary Committee, the Town Clerk read a report of the proceedings before the House of Commons Committee on the Pontypridd and Rhondda Water Bill, when the Corporation's opposition was defeated. He also read a resolution, since adopted by the Water Committee, in favour of continuing the opposition in the House of Lords. Alderman Beavan said that, personally, he felt they would have very little prospect of success. The Commons Committee, and particularly the Chairman, were very emphatic against what they regarded as a monopoly; and he feared the Lords Committee might take the same view. Cardiff had been forced to spend tens of thousands of pounds in order to make provision to carry out their Taff Vawr scheme; and now they were being crippled in this way. On the motion of Mr. Vivian, seconded by Mr. Morgan Thomas, it was decided not to continue the opposition; but it was understood that the Corporation would be represented to watch the progress of clauses.

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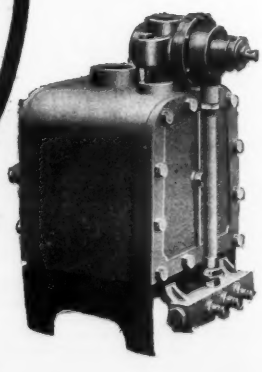

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MONTE VIDEO GAS COMPANY, LIMITED.

Increased Consumption in the City Compensates for the Reduced Price Charged.

The Ordinary General Meeting of the Company was held last Thursday, at Winchester House, Old Broad Street, E.C.—Mr. T. C. TATHAM in the chair.

The SECRETARY (Mr. Henry Kearns) read the notice convening the meeting; and the Directors' report and the accounts were taken as read.

The CHAIRMAN, in moving their adoption, and commenting on the principal items of the latter, said on the debit side of the balance-sheet it would be noticed that the reserve account remained at £32,000, and the insurance fund at £12,500. This year they had transferred £4000 from profit and loss to reserve for renewals account, which increased that amount to £10,500. At the last meeting, he mentioned that it would be necessary to commence the reconstruction of a retort-house before the end of 1909. Finding, however, that they could get through the winter of this year with the old retort-house, the Directors decided to defer the new work until they had obtained actual experience of a full year's trading at the reduced prices, so that they could gauge with greater precision the requirements of the future. The work having been postponed for five months, the Board had definitely arrived at a decision as to the capacity of the plant to be installed, and which would provide to a relative extent for the future. It was intended to have the new carbonizing plant ready if necessary for work by April, 1911, which was the commencement of their winter season in Monte Video. By the process they were adopting, it was anticipated that a considerable saving would be effected in fuel and labour; and this he hoped would be advantageously reflected in their accounts for 1911. The contingency account now stood at £21,013. Regarding the credit side of the balance-sheet, it would be observed that they had written off capital for depreciation £4807, and had added £4567 for expenditure on new mains, meters, and extension of coal-stores, which latter work was already completed. The result was the total capital expenditure now stood at £540,719, or £240 less than last year. In noting the differences in the items as to stocks, he mentioned that the stock of gas-fittings now amounted to £6341, which was a decrease of £153. The former figure was well represented by the stock, as they had disposed of all obsolete fittings by auction, and would move into the new offices and show-rooms with nothing but the latest and most artistic articles on view. The stock of residuals showed an increase of £768. Owing to the increased sale of gas, a larger quantity of coal was carbonized, and more coke was made and sold. But as coal was selling at low prices during the year, owing to competition among the local merchants, this, in some degree, militated against the price of coke; and some of their customers used coal instead. This competition, however, ceased in January last. The selling price of coal was raised; and their stock of coke was reduced at the end of March to as low as 6 tons. As, however, the season of heavier make was now upon them, they would no doubt be able to supply the demand for this increasingly popular fuel. Other items in the balance-sheet came under review; and then turning to the revenue account, he said the income from the gas department showed an increase of £565, which, though small, was satisfactory, considering that the reduced price was being charged for gas over the whole of the twelve months as compared with only five months in the previous year. It was worthy of remark that, if they had received for the increased amount of gas sold in the seven months January to July, 1909, the same price as ruled in the same period of 1908, there would have been an increased revenue of £8937; and if the sales had not increased, the reduction in the price of gas would have meant a loss of revenue over the twelve months of £13,025. The increase in the consumption had, however, not only enabled them to maintain the revenue of 1908, but had given an increased profit of £565 in the gas department. From these figures, the shareholders would be able to judge that the policy of cheap gas was having a beneficial effect on their sales. A good increase in consumption had to be recorded from cookers, engines, and industrial purposes, for all of which gas was sold at a specially low rate. They could not perhaps expect to continue to increase their gas business at this rate; but he thought they might look forward to steady improvement in the future. Having referred to the dock and workshops department, and the revenue therefrom, he said that the cost of manufacture and expenses at Monte Video showed a decrease of £3634. They had to carbonize a much larger quantity of coal to meet the increased sales of gas, and this also necessitated a considerable increase in wages for manufacture and distribution, and the purchase of a larger quantity of materials for purification, and for upkeep. As to the profit and loss account, he mentioned that the items of bad and doubtful debts were £131 less, and the total was only £367. This reflected great credit on the management in Monte Video. The amount brought into the account from 1908 was £11,929; and with this the final result was a balance of £30,946, out of which the dividend would be paid, leaving £11,979 to be carried forward.

Mr. CHARLES HUNT seconded the motion, which was unanimously carried.

On the proposition of the CHAIRMAN, seconded by Mr. ROBERT MORTON, a dividend for the second half of the year of 8s. per share was declared, less income-tax.

Moved by the CHAIRMAN, and seconded by Mr. JOHN MEWS, Mr. Robert Morton was returned to his seat at the Board; and proposed by Mr. HUNT, seconded by Mr. MEWS, the Chairman was also re-elected.

The Auditors (Messrs. G. Sneath and L. E. Halsey) were next re-appointed.

The thanks of the shareholders were conveyed to the officers and staff, both at home and abroad, on the motion of the CHAIRMAN, seconded by Mr. MORTON; and a similar compliment was paid to the Chairman and Directors on the proposition of Mr. THOMAS WILKINS seconded by Mr. CONSTABLE.

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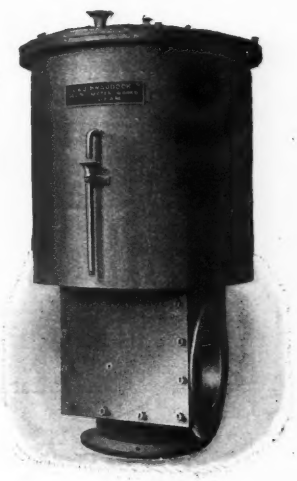

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NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The accounts of the Dundee Corporation Gas Department for the year which ended on April 30 have been made up. The total quantity of gas sold was 824,319,450 cubic feet, and this, after allowing £3140 for discount and £103 for bad debts, realized £91,099. The price of gas to ordinary consumers was 2s. 3d. per 1000 cubic feet, and to prepayment meter consumers 2s. 7d. A year ago a reduction of 1d. per 1000 cubic feet was made. The revenue then reported was £91,128. During the past year, the quantity of gas consumed at the works was 6,733,000 cubic feet, and the gas unaccounted for, 48,549,558 cubic feet, representing 5·519 per cent. of the total make, which was 879,602,000 cubic feet. There was a revenue from coke of £18,691, as compared with £20,776; from sulphate of ammonia, of £9938, as compared with £9368; and from tar, of £4466, as compared with £3624. The total income was £125,400, as compared with £126,172. The cost of manufacturing gas was £74,881, as compared with £79,167. Distribution cost £12,892, as compared with £10,881. Rents, rates, and taxes required £6853, as compared with £6438. Administration cost £4434, as compared with £3983. The total expenditure amounted to £99,062, as compared with £100,470. The balance carried to net revenue account was £26,338, as compared with £25,702. Out of this sum there have been paid: Annuities, £6132; interest, £8354; sinking fund, £10,700; and contingent fund, £1000; leaving £2277 to be carried forward, as compared with £2191. The quantity of coal carbonized was 89,194 tons. There were employed, besides, 56,870 gallons of carburetted water gas oil; and 62,982 gallons of benzol were used for enrichment. The coal gas made amounted to 865,338,000 cubic feet, and the carburetted water gas to 14,374,000 cubic feet. The quantity of gas made per ton of coal carbonized was 9701 cubic feet; the yield of coke was 53,426 tons—equal to 11·98 cwt. per ton of coal, exclusive of that used for firing retorts; the yield of coal tar was 947,503 gallons, of carburetted water gas tar 15,710 gallons, and of sulphate of ammonia 1089 tons. The cost of coal was £51,281, and of benzol £1652, which gives a cost of production of 1s. 0·23d. per 1000 cubic feet of gas. In the case of carburetted water gas, the cost of production was 1s. 3·33d. per 1000 cubic feet. The cost per 1000 cubic feet for both coal and carburetted water gas was 1s. 4·20d. The estimates for the current year are based on the same charges for gas as last year; the increase in the price of coal rendering it inadvisable to make any reduction. The quantity of coal estimated to be required is 92,637 tons, from which, at 9800 cubic feet per ton, the yield of gas will be 907,840,000 cubic feet. The make of carburetted water gas is put down at 20 million cubic feet, giving a total production of gas of 927,840,000 cubic feet. The cost of coal is expected to be £55,582, as compared with £51,281 for 89,194 tons. Benzol is expected to cost £1000, carburetted water gas £1500, and carbonizing charges £5596; making a total of £63,678, which, with other charges, will bring up the total cost of manufacture to £77,948. Distribution is entered at £11,950; rents, rates, and taxes at £7310; administration at £4650; and annuities, interest, sinking fund, and contingent fund, including £430 to meet contingencies and emergencies, at £28,612—making a total estimated expenditure of £130,470. Sales of gas are estimated to realize £94,333, and of residual products £34,786; and the revenue from other sources is expected to bring up the revenue to balance the expenditure.

During the past fortnight, rapid progress has been made with the gasworks extensions at Inverkeithing. Fully half-an-acre of a pasture meadow which adjoins the works has been taken in, and the work of excavation for the gasholder tank has been begun. A new retort-house, engine-house, and governor-house are being erected. Messrs. Henry Balfour and Co., Limited, of Leven, Fife, are the Contractors for the gasholder and condensers, and also for the girder work and iron roofing. The Engineer to the scheme is Mr. H. O'Connor, F.R.S.E., of Edinburgh, who has also prepared the plans for the buildings.

Mr. J. W. Napier, the Gas Engineer to the Corporation of Alloa, has been engaged by the Town Council of Grangemouth to consider the subject of altering and extending the gas-works, including the retorts and purifiers, and to report to the Corporation what he would recommend them to do.

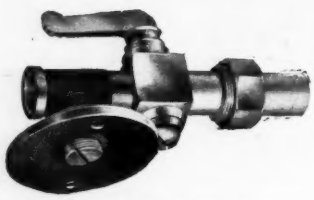
On Wednesday evening, the Corporation of Falkirk appointed Mr. John Wilson, of Glasgow, Assistant Gas Manager, in place of Mr. H. Rule, now Gas Manager at Kelty.

The Buckie Gaslight Company, Limited, have paid a dividend at the rate of 7½ per cent.

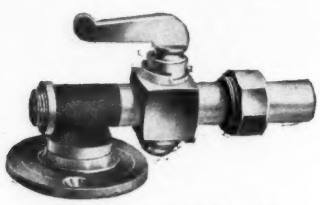
The Parliamentary Bills Committee of the Glasgow Town Council remitted to a Sub-Committee a resolution adopted by the Corporation, to the effect that whereas in Glasgow the underground pipes and underground works of the Corporation are assessed on one-fourth part only of the annual valuation thereof, and whereas the same classes of subjects are assessed in the county area immediately adjoining Glasgow on the full annual value thereof, and whereas if these works in Glasgow were assessed on the full value, the same as is done in the county, it would mean a payment from the water, gas, electricity, and tramways departments of the Corporation of a sum of about £35,000, or a reduction of about 2d. in the pound off the municipal assessments in the city; and whereas at the recent interview with the Secretary for Scotland on the subject of the assessment of these works it did not appear to be the intention of the Government to deal with the matter in the meantime, therefore that it be remitted to the Parliamentary Bills Committee to consider and report upon the whole subject, and as to whether the Corporation should make application to Parliament to have the law altered. The Sub-Committee have agreed to adhere to their former decision—that it is not desirable to make application to Parliament to have the law altered so as to provide for the underground pipes and underground works of the Corporation within the city being assessed on their full annual value; and to recommend to the Parliamentary Bills Committee to remit to a Sub-Committee to take joint action with corporations and others interested, on the lines of endeavouring to get the Government or a Member of Parliament to introduce a Bill amending the law as to the method of the valuation of gas, water, tramways,

Something New!

TWO-WAY STOVE TAP.



USED AS STRAIGHT-WAY TAP.



USED AS ELBOW TAP.

The alteration is made by changing the position of *Screwed Nipple.*

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and electric light undertakings, and giving effect to the recommendations of the Royal Commission which reported in 1902—viz., that in rural areas underground gas and water piping, and underground works connected with such undertakings, should only be assessed on one-fourth of the annual value thereof; and, further, that tramway lines and the underground works of electric light undertakings be similarly treated—and to endeavour to get legislation passed in regard to the matter.

CURRENT SALES OF GAS PRODUCTS.

Sulphate of Ammonia. LIVERPOOL, *May* 28.

In the early part of the week improved prices were paid in order to cover urgent orders. Later, however, the market became easier, and the closing quotations are £11 15s. to £11 16s. 3d. per ton f.o.b. Hull, £11 17s. 6d. per ton f.o.b. Liverpool, and £11 17s. 6d. to £11 18s. 9d. per ton f.o.b. Leith. Apart from any orders which may have been taken speculatively abroad, there has not been much business done in the forward position; makers not being inclined to sell at a discount on prompt prices unless for autumn months, and there being no keen buyers in any position.

Nitrate of Soda.

This article continues quietly steady at 9s. 6d. per cwt. for ordinary quality and 9s. 9d. for refined, on spot.

Tar Products. LONDON, *May* 30.

The markets for tar products have remained firm during the past week. Pitch is still very firm, and improved prices are reported to have been paid in some quarters. The inquiry from abroad is certainly very good. Creosote is steady, and distillers are very firm in their ideas of price for delivery over the summer. There is a very good demand for 90 per cent. benzol, and makers are firm in their ideas of price. The position remains about the same in crude carbolic acid. Solvent naphthas are steady.

The average values during the week were: Tar, 18s. 3d. to 22s. 3d., *ex* works. Pitch, London, 41s. to 41s. 6d.; east coast, 39s. 6d. to 40s. 6d.; west coast, 38s. 6d. to 39s. 6d. f.a.s. Mersey ports. Benzol, 90 per cent., casks included, London, 8d. to 8½d.; North, 8d.; 50-90 per cent., casks included, London and North, 9d. Toluol, casks included, London, 10½d.; North, 10d. to 10⅝d. Crude naphtha, in bulk, London, 4⅛d. to 4⅜d.; North, 4d. to 4⅛d.; solvent naphtha, casks included, London, 1s. 3½d. to 1s. 4d.; North, 1s. 4d. to 1s. 6d.; heavy naphtha, casks included, London, 1s. to 1s. 1d.; North, 11d. to 1s. Creosote, in bulk, London, 2⅛d. to 2⅜d.; North, 2d. to 2⅛d. Heavy oils, in bulk, 2⅝d. to 2⅞d. Carbolic acid, 60 per cent., casks included, east coast, 1s. 0⅛d.; west coast, 1s. Naphthalene, £4 10s. to £8 10s.; salts, 40s. to 45s., bags included. Anthracene, "A" quality, 1⅛d. to 1⅜d. per unit, packages included and delivered.

Sulphate of Ammonia.

The market remains quiet, but there has been no lowering of price. To-day actual Beckton is quoted at £12, and outside makes on Beckton terms £11 12s. 6d. to £11 13s. 9d. In Hull, £11 15s. to £11 17s. 6d. is asked; and in Liverpool, £11 16s. 3d. to £11 17s. 6d. In Leith, the price is £11 18s. 9d.; and in Middlesbrough, £11 17s. 6d.

Malta and Mediterranean Gas Company, Limited.—The Directors' report for the year ended March 31 states that the balance of the general revenue account is £6084. The Directors recommend the payment of the usual dividends on the first and second preference capital, and 4 per cent., free of income-tax, on the ordinary capital, making with the interim dividend paid in December, 6 per cent. for the year, and leaving a balance of £1182 to be carried forward.

Sales of Stocks and Shares.—There was a very keen demand for two new issues of capital offered by Messrs. A. & W. Richards at the Mart, Tokenhouse Yard, E.C., last Tuesday, under instructions from Directors. They consisted of £2200 of "D" stock of the Barnet District Gas and Water Company, ranking for a maximum dividend of 7 per cent., but entitled to 5¼ per cent. as from to-morrow; and £4000 of 5 per cent. perpetual debenture stock of the Dorking Gas Company. The former fetched £121 to £125 per £100 of stock; and £3800 of the latter, sold at £108 to £111 10s. per £100, produced the required quantity of capital. Last Thursday, Mr. F. W. Baker (Messrs. Sadler and Baker) sold at Camberley 600 additional ordinary £10 shares in the Frimley and Farnborough District Water Company, at an average price of £15 5s. each; the total amount realized being £9151.

A Question of Books at Carlisle.—Mr. Eggleston called the attention of the Carlisle Town Council to accounts for books for the Gas and Electricity Departments, and moved that they be referred back to the Committees, and that a full and detailed account be presented to the Council. He objected to the vagueness of the minutes, and wished to be assured of the necessity and utility of the books in question. In the course of a lengthy speech, he said that in the Gas Department books had been put into the hands of workmen who were quite unaccustomed to this kind of work. A great amount of friction and trouble had arisen through the introduction of these new books. There were men at the gas-works who had served the Council faithfully and well for several years, and who were being subjected to such insults as he ventured to say "no educated Britisher would submit a gang of Kaffirs to." The amendment was withdrawn, after the Chairman of the Gas Committee (Mr. Buck) had asserted that the charges made were untrue, and that the books were required to record information with regard to costs in the different sections of the works. Mr. King then gave notice that he would move at the next meeting that the Gas and Electricity Committees be requested to report upon the grave charges that had been brought against them.

What about the Hot Baths?

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COAL TRADE REPORTS.

Northern Coal Trade.

The coal trade of the North is more active; and the settlement of many contracts has rather steadied the prices. In the steam coal trade, best Northumbrians are from 11s. 4½d. to 11s. 6d. per ton f.o.b. Second-class steams are from 9s. 9d. to 10s. 3d.; and steam smalls are from 5s. 9d. to 7s. There is a rather better demand for steam coals for export, and the output is now normal, so that the shipments are better than they have been. In the gas coal trade, prices are steadier. Durham gas coals vary according to quality—the usual kinds being from 9s. 6d. to 10s. 4½d. per ton f.o.b., and "Wear specials" up to 10s. 9d. Many of the long contracts have now been arranged. Those of the Newcastle and Gateshead Gas Company have been completed for a year—the quantity being a little over 300,000 tons. The contracts have been renewed at prices ranging from 9s. 6d. to nearly 10s. per ton at the works—prices which show an average advance on those of the past year of about 10d. or 10½d. per ton. It will be seen that the advance is just about the same as that under the contracts for the large London Companies. The contracts for Devonport are also closed at somewhat similar prices; and those for Christiania are said to be concluded for "special" gas coals at about 10s. 7d. per ton. f.o.b., but this depends on the allowance for freight. In the coke trade, the market is quiet; and gas coke—though in lessened output—is from 13s. 3d. to 13s. 9d. per ton f.o.b.

Scotch Coal Trade.

Trade continues to be quiet; but the demand for shipping is slightly better. Steam coal shows no improvement in demand. Washed stuffs and dross are in good request. The prices now quoted are: Ell, 9s. 3d. to 10s. 3d. per ton f.o.b. Glasgow; splint, 10s. to 10s. 3d.; and steam, 9s. 3d. to 9s. 6d. The shipments for the week amounted to 286,239 tons—a decrease of 14,614 tons upon the preceding week, and of 29,920 tons upon the corresponding week of last year. For the year to date, the total shipments have been 5,949,237 tons—an increase of 664,284 tons upon the corresponding period.

Shrewsbury and the Burner Bill.

When moving at a meeting of the Shrewsbury Town Council that a further petition be presented to Parliament in opposition to the Gas Companies Standard Burner (No. 2) Bill, Alderman Deakin said that it would be remembered the Council passed a resolution some time ago authorizing the presentation of a petition in Parliament against a Bill promoted by the Shrewsbury and other Gas Companies. Shrewsbury and other towns were accordingly represented by Counsel; and their case was laid before the Committee of the House of Lords. He regretted to state, however, that they were not successful in obtaining the protection in the interests of the gas consumers which they thought desirable. The substitution of a different method of testing would be equivalent to reducing the illuminating power of the gas; and they tried, therefore, to get a clause introduced laying it down that, notwithstanding the different method of testing, the illuminating power of the gas should remain as hitherto. It had been decided to take no further action before the Committee of the House of Lords, but to reserve the right to oppose the Bill in another place. It was with this object that he submitted the motion before them. He reminded them that they were the authority for testing the gas; and it was their duty to see that the consumers obtained good value for their money. Their position was that, if the quality of the gas was reduced, there must be an equivalent reduction in the price. The motion was carried.

Coal Carbonizing Company, Limited.

Among the files of new joint-stock companies which are available for inspection at Somerset House is that of the Coal Carbonizing Company, Limited, of Friars House, New Broad Street, E.C., which was registered on the 23rd inst., with a capital of £25,000 in £1 shares. Under the Articles of Association, power is taken to, among other things, carry on the business of coal and coke merchants, colliery proprietors, and dealers in machinery and apparatus for increasing and improving the illuminating or heating power of gas, spirit, oil, and other heat-producing agents; to enter into an agreement with Fuel Limited; and to act as electricians and manufacturers and suppliers of gas, fuel, and electricity, for the purpose of light, heat, or power. According to the prospectus, however, the Company has been formed primarily with the object of testing the value of certain patented processes for the manufacture of smokeless fuel and briquettes from small coal. There are two distinct types of plant; and one of these, which is a machine designed for use in an ordinary gas-retort, is said to enable a gas undertaking to produce a good, flaming, smokeless fuel with little or no alteration of the existing plant. The Directors contemplate continuing experiments in respect of the second type which have been already initiated at a gas-works near London, and, on completion, entering into an agreement to take over several benches of retorts and fit them up—the gas obtained to be sold to the Gas Company, while the tar, fuel, and ammonia would be retained by the Coal Carbonizing Company. The Directors are John Chapman (Coaling and Chartering Agent), George V. Craggs (Shipbroker), Richard S. Richards (Engineer), and William Slyvers (a Director of the Anglo-Californian Oil Syndicate). Two of the patents taken over by the Company were abstracted in the "JOURNAL" for the 3rd inst. (p. 320).

Birmingham Boundaries Extension.—The Local Government Board have issued a draft Provisional Order dealing with the extension of the Birmingham city boundaries, which was the subject of a lengthy local inquiry some months ago. The main lines of the scheme are that the boundary of the existing city shall be altered so as to include in addition to that area Aston Manor borough, the Erdington district, the Handsworth district, the added part of King's Norton and Northfield, and the Yardley district. The excluded part of King's Norton is to be made a separate parish, and called Wythall.

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Cookery Lectures at Cardiff.—The course of cookery demonstrations at the new and commodious show-rooms of the Cardiff Gaslight and Coke Company which were recently inspected by the members of the Wales and Monmouthshire Institution was inaugurated by Miss Lillie Miles last Thursday, and proved a great success. In fact, the applications for tickets were so numerous that Mr. George Clarry, the Manager and Secretary of the Company, had to have the lecture and reception repeated on the day following. This week, he is arranging special lectures on artisan cookery; and the wives of the Company's co-partners are going to attend a special lecture, for which Miss Miles, with her usual ability, has been providing a very attractive programme. It is also proposed to assist the young idea by inviting to the cookery demonstrations on special occasions the elder girls from the Cardiff Elementary Schools. With so much excellent propagation work, it will be surprising if the Company do not reap a substantial advantage in an increased output of gas for cooking purposes.

Extension of the Ashburton Gas-Works.—An inquiry was held at Ashburton, Devon, on Wednesday week, by Mr. W. M. E. Meade-King, respecting an application by the District Council for the sanction of the Local Government Board to a loan of £800 for alterations and additions to the gas-works. Mr. J. A. Gray, of Teignmouth, who had prepared plans of the alterations, explained that at times in the winter the storage was not sufficient, and there had been complaints as to the quality of the gas. The present works were capable of producing 30,000 cubic feet of gas per day; and the maximum consumption was 15,000 cubic feet. The present holder was defective, with the result that its working capacity was only about three-fourths of its nominal storage; and a new holder was to be provided which would contain 15,000 cubic feet. Seven tenders had been received for the work, varying from £780 to £520; but the lowest did not comply with the specification. Objection was raised by a ratepayer to the proposed addition, on the ground that the site of the works is too small to admit of extensions.

Reduction in Price at Bingley.—The report of the working in the past twelve months was submitted at the May meeting of the Bingley Urban District Council by Mr. Rushforth, the Chairman of the Gas Committee, who stated that there was a net profit for the year of £860. He said the Committee proposed that the price should be reduced 3d. per 1000 cubic feet, and this would take a sum of £1120. Pointing out how such a large reduction was possible, he said that there would be £600 less to pay in the next twelve months for interest and sinking fund; while during the past twelve months there had been extra expenditure which was not likely to recur, amounting altogether to £900. In the coming year it was also expected there would be savings in other items of expenditure. He proposed that the reduction in price be sanctioned. As an amendment, Mr. Brigg moved that a reduction of 1d. per 1000 cubic feet only be made, and that a sum equal to 2d. per 1000 cubic feet be devoted to the relief of the rates; but on a vote the amendment was lost—three members only voting for it. The original motion was afterwards agreed to.

The South Staffordshire Mond Gas (Power and Heating) Company, of Dudley Port, are about to have erected six "Bennis" stokers and self-cleaning compressed-air furnaces for their 9-feet boilers.

The Directors of the Continental Union Gas Company, Limited, have resolved to pay an interim dividend of 2 per cent., free of tax, for the past half year, on the ordinary stock (being at the rate of 4 per cent. per annum), together with the half-yearly dividend of 3½ per cent. on the preference stock; the latter being less income-tax.

At the annual meeting of the Staffordshire Potteries Water-Works Company, the report was adopted, and the shareholders sanctioned the payment of a dividend at the rate of 10 per cent. per annum on the consolidated ordinary stock, and of 7 per cent. on the consolidated new ordinary stock. The Chairman (Mr. J. Maddock) explained the present position with regard to the Bill now before Parliament to give the Company further powers, and referred to the threatened opposition of the new Federated Council.

The Gas Committee have reported to the Bridgnorth Town Council that the question of the desirability of the Gas Department undertaking the maintenance, for a small quarterly charge, of incandescent gas-lights, including monthly inspection and cleaning of burners, and the renewal of mantles and chimneys, was now under consideration. The Committee were issuing to gas consumers details of the proposal, and asking for replies for their guidance at an early date. Alderman Whitefoot said that when complaints of bad incandescent lights were investigated, they were generally found to be due to want of attention on the part of the consumer. In places where this matter had been taken up by the gas authorities, it had proved satisfactory to the customers.

APPLICATIONS FOR LETTERS PATENT.

12,135.—Grath, J., and Drexler, H., "Closing gas-taps." May 17.
12,160.—Schodt, P. G. de, "Mantle lighting." May 17.
12,191.—Prosser, H. R., "Burner screw coupling." May 18.
12,209.—Keller-Kurz, F., "Carburetting gas." May 18.
12,210.—Greaves, W., "Retort materials." May 18.
12,241.—Yates, H. J., "Gas-fires." May 18.
12,296.—Scott, J. B., "Gas-purifiers." May 19.
12,297.—Wright, A. C., and Hansford, J., "Gas-meters." May 19.
12,304.—Rostin, H. P., "Expansion tap." May 19.
12,340.—Adamson, R. A., "Cleaning water-mains." May 19.
12,353.—Still, W. M., and Sons, Ltd., and Sawyer, R., "Lighting and extinguishing lamps." May 19.
12,380.—O'Neil, H. A., "Pipe-joint." May 21.
12,394.—Lovett, L., "Mantle fork." May 21.
12,397.—Easthope, E., Jun., "Gas-engines." May 21.
12,404.—Hunt, W., "Exhauster or compressor." May 21.
12,438.—Anderson, D., "Gas-lamps." May 21.
12,439.—Anderson, D., "Gas-controllers." May 21.
12,440.—Rockwell, A. F., "Carbonizing processes." May 21.

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The Morecambe Gas Committee report to the Town Council that they have resolved that all consumers of gas by ordinary meter desiring to have their supply by a slot-meter may do so on payment of 5s.; being the cost of transfer—provided the ratable value of the house is not over £18.

When a boy was summoned at the Sheffield Children's Court for smashing a gas-lamp, it was stated on behalf of the Chief Constable that the practice of breaking street-lamps had assumed a most serious aspect in the city. A statement had been drawn up by the police showing the amount of money expended on repairing lamps that had been broken by having had stones or other missiles thrown at them. For the period extending from March 26, 1909, to March 25, 1910, a sum of no less than £400 had been paid by the ratepayers in repairing lamps that had been so smashed.

The Newcastle-upon-Tyne and Gateshead Gas Company have placed a contract with Messrs. Ashmore, Benson, Pease, and Co., for six luteless purifiers, consisting of two twin boxes 68 feet by 34 feet and two single boxes 34 feet square, fitted with 24 steel covers and a 24-inch Weck centre valve and connections. The contract also includes a steel-frame purifier-house 126 feet long and 93 feet span, with elevated floor and cast-iron deck plates and steel roof; and it has to be completed by the 30th of September next. The whole of the plant has been designed by, and will be carried out under the supervision of, the Company's Engineer, Mr. T. Hardie.

In resigning his seat on the Matlock Bath Council, Mr. D. P. Pearson wrote a letter in the course of which he said: "As Chairman of the Gas Committee, I was surprised to learn from the Auditor that the Local Government Board had written to the Council protesting against transfers of profit from the Gas Department to assist the general district rate, while at the same time the accounts due to creditors were not paid. This letter I never saw; and the Gas Department Secretary positively states he never saw it. As the matter contained in the letter affected the Gas Department, I protest as a councillor, and more especially as Chairman of the Gas Committee, that such an important communication should be suppressed and dealt with in a secret manner by members of the Council."

Early last Tuesday morning a 12-inch main belonging to the South Staffordshire Water Company, situated near Hill Crest, Heath Hayes, burst with a tremendous explosion. The footpath in many places was washed away; and considerable damage was done to the roadway. When the water was shut off, it was discovered that there was a large rent in the main about 4 feet long. It was stated that the breakage was due to mining subsidences.

The Economical Gas Apparatus Construction Company, Limited, has been registered with a capital of £15,000, in £1 shares, to take over as a going concern the business now carried on by the Economical Gas Apparatus Construction Company, Limited, and to carry on the business of gas engineers and contractors, &c. The signatories are Messrs. J. T. Westcott, E. J. Davison, B. B. Waller, and E. C. Mingel, who are the first Directors. The registered office is at No. 19, Abingdon Street, Westminster, S.W.

The Ilford Education Committee had under consideration at their last meeting estimates from the Electrical Engineer for installing electric light at two schools. The School Management Committee reported that it was inopportune to consider the suggested scheme at present, owing to financial reasons. In the course of the discussion which ensued, Mr. Philpot said that, as the electric light undertaking was the property of the town, suggestions for the lighting of the Council schools from it should be sympathetically considered. The schools should be lighted with electricity for the sake also of the children. He moved that the paragraph be referred back to the Committee. Mr. Church contended that the question ought to be gone into from the ratepayers' point of view, as to whether gas or electricity was the cheaper, and also as to which was the best light. One member failed to see why, because the electric lighting undertaking belonged to the town, the Committee should waste money in making the suggested change, and expressed the opinion that incandescent gas light was better than the electric light. Another speaker thought that the schools were already lighted in a way that gave satisfaction. In the result, the amendment to refer the matter back to the Committee was negatived, and the Committee's recommendation that the matter be deferred until at least the end of the present financial year was carried.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

CHIEF CLERK. Cheltenham Gas-Works.
DRAUGHTSMAN. C. & W. Walker, Limited, Donnington.
REPRESENTATIVES (LIGHTING ENGINEERS). No. 5246.
METER INSPECTOR. No. 5244.
AGENTS (MANTLES). H. J. 6780, care of Neyroud and Sons, Queen Victoria Street, E.C.

Situation Wanted.

LEADBURNER. Elliott, Shepherd's Bush, W.

Plant, &c. (Second Hand), for Sale.

PIPES, BENDS, &c. Chesterton Gas Works.

Plant, &c. (Second-Hand), Wanted.

GASHOLDER. No. 5215.

Patent Licences.

WASHING AND COOLING GAS. Cruikshank and Fairweather, Chancery Lane, W.C.

Meetings.

INSTITUTION OF GAS ENGINEERS. Institution of Mechanical Engineers. June 14-16.
MALTA AND MEDITERRANEAN GAS COMPANY. London Offices. June 14. Twelve o'clock.

Stocks and Shares.

ASCOT GAS AND ELECTRICITY COMPANY. June 14.
BRENTWOOD GAS COMPANY. June 14.
EAST GRINSTEAD GAS AND WATER COMPANY. June 14.
FELIXSTOWE GASLIGHT COMPANY. June 10.
GUILDFORD GAS COMPANY. June 14.
NEWPORT (MON.) GAS COMPANY. June 7.

TENDERS FOR

Benzol.

LEIGH GAS AND WATER DEPARTMENT. Tenders by June 11.

Coal and Cannel.

BARNSLEY GAS COMPANY. Tenders by June 7.
BOLTON GAS DEPARTMENT. Tenders by June 3.
BRIDGNORTH GAS DEPARTMENT. Tenders by June 18.
BRISTOL GAS COMPANY. Tenders by June 8.
CHESTER GAS COMPANY. Tenders by June 6.
CIRENCESTER GAS COMPANY. Tenders by June 2.
DEWSBURY GAS DEPARTMENT. Tenders by June 9.
GLOSSOP GAS COMPANY. Tenders by June 11.
HAVERHILL GAS DEPARTMENT. Tenders by June 8.
LEIGH GAS AND WATER DEPARTMENT. Tenders by June 11.
NEWPORT (MON.) GAS COMPANY. Tenders by June 15.
OLDBURY GAS DEPARTMENT. Tenders by June 18.
PETERBOROUGH GAS COMPANY. Tenders by June 11.
SALISBURY GASLIGHT COMPANY. Tenders by June 9.
SLOUGH GAS COMPANY. Tenders by June 7.
SUTTON-IN-ASHFIELD GAS DEPARTMENT. Tenders by June 6.
TAUNTON GASLIGHT COMPANY. Tenders by June 6.

Coke.

SUTTON-IN-ASHFIELD GAS DEPARTMENT. (FOR SALE.) Tenders by June 6.
JOSEPH BOAM, LIMITED, KING'S LYNN. (WANTED.)

Furnace Slag, Fettling, Mill Scale, Tarpaulin Cuttings, &c.

GREAT WESTERN RAILWAY. Tenders by June7.

General Stores (Lead Piping, Vitriol, Lime, &c.).

LEIGH GAS AND WATER DEPARTMENT. Tenders by June 11.
LOUGHBOROUGH GAS DEPARTMENT.
SUTTON-IN-ASHFIELD GAS DEPARTMENT. Tenders by June 6.

Meters.

SUTTON-IN-ASHFIELD GAS DEPARTMENT. Tenders by June 6.

Pipes, &c.

LEIGH GAS AND WATER DEPARTMENT. Tenders by June 11.

Steam Hoist and Gantrys.

MIDDLETON GAS DEPARTMENT. Tenders by June 18.

Tar and Liquor.

ACCRINGTON GAS AND WATER BOARD. Tenders by June 6.
BARNSLEY GAS COMPANY. Tenders by June 7.
BRIDGEWATER COLLIERIES COKE-WORKS. Tenders by June 20.
GREAT WESTERN RAILWAY. Tenders by June 7.
LOUGHBOROUGH GAS DEPARTMENT. Tenders by June 10.
SUTTON-IN-ASHFIELD GAS DEPARTMENT. Tenders by June 6.

Retort Settings.

SPALDING GAS DEPARTMENT. Tenders by June 18.

OXIDE OF IRON.

O'NEILL'S OXIDE
For GAS PURIFICATION,
LARGEST SALE OF ANY OXIDE.

SPENT OXIDE PURCHASED IN ANY DISTRICT.

GAS PURIFICATION & CHEMICAL CO., LD.,
PALMERSTON HOUSE,
OLD BROAD STREET, LONDON, E.C.

WINKELMANN'S
"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for GAS-WORKS.
ANDREW STEPHENSON, 182, Palmerston House, Old Broad Street, London, E.C. "Volcanism, London."

BROTHERTON & CO., LIMITED.
Offices: City Chambers, LEEDS.
Correspondence invited.

PATENTS AND TRADE MARKS
PUBLICATIONS, "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; "SUBJECT-MATTER of PATENTS," 6d.
MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 & 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 54 & 47, Westminster Bridge Road, LONDON, S.E.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS, AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 815 Oldham, and 2412 Hop, London.
Telegrams:—
"BRADDOCK, OLDHAM," and "METRIQUE, LONDON."

OXIDE OF IRON (BOG ORE).
ANY QUANTITY. ANY PORT. ANY STATION.
DONALD M'INTOSH,
110, CANNON STREET, LONDON.

AMMONIACAL Liquor wanted.
BROTHERTON AND CO., LTD., Ammonia Distillers. Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, SUNDERLAND, AND WAKEFIELD.

TAR WANTED.
Telephone: Central Manchester, 7002.
Telegrams: "UPRIGHT."
Apply, THOMAS HORROCKS,
Albert Chemical Works, BRADFORD, MANCHESTER.
Pitch, Creosote, Brick and Fuel Oils, Benzol, Solvent Naphtha, Carbolic, Sulphate of Ammonia.

LUX'S GAS PURIFYING MASS.
See Advertisement on p. 588.
FRIEDRICH LUX, LUDWIGSHAFEN-AM-RHEIN.

OXIDE OF IRON.
(NATURAL.)
SPENT OXIDE PURCHASED.
BALE'S FIRE CEMENT.
PAINT FOR GAS-WORKS.
BALE & CHURCH,
5, CROOKED LANE, LONDON, E.

SULPHURIC ACID.
SPECIALLY prepared for the Manufacture of SULPHATE OF AMMONIA.
SPENCER CHAPMAN & MESSEL, LTD.
with which is amalgamated WM. PEARCE & SONS, LTD.
86, Mark Lane, LONDON, E.C. Works: SILVERTOWN.
Telegrams: "HYDROCHLORIC, LONDON."
Telephone: 341 AVENUE.

"GAZINE" (Registered in England and Abroad). A radical Solvent and Preventative of Naphthalene Deposits, and for the Automatic Cleaning of Mains and Services.
It is also used for the enrichment of Gas.
Manufactured and supplied by C. BOURNE, West Moor Chemical Works, KILLINGWORTH, or through his Agent, F. J. NICOL, Pilgrim House, NEWCASTLE-ON-TYNE.
Telegrams: "DORIC," Newcastle-on-Tyne. National Telephone No. 2497.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

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All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

Telegrams: "GASKING, LONDON." Telephone: P.O. 1571a Central.

ROBERT DEMPSTER & SONS, Ltd., Contractors for Complete CARBONIZING PLANTS and every description of GAS APPARATUS and ELEVATING and CONVEYING PLANT, ROSE MOUNT IRON-WORKS, ELLAND.

BENZOL
AND
CARBURINE FOR GAS ENRICHING.

ALSO

THE MAXIM PATENT CARBURETTOR.

For Prices, &c., apply to
THE GAS LIGHTING IMPROVEMENT CO., LTD.,
7, BISHOPSGATE STREET WITHOUT,
LONDON, E.C.
Telegraphic Address: "Carburine, London."

SULPHURIC ACID for Sale, specially suitable for making Sulphate of Ammonia. BROTHERTON AND CO., LTD., Chemical Manufacturers, Works: BIRMINGHAM, LEEDS, SUNDERLAND, and WAKEFIELD.

R. & G. HISLOP,
GAS ENGINEERS, RETORT BUILDERS,
CONTRACTORS, &c.

RETORT SETTINGS, COAL-TESTING PLANT,
BOILER FIRING.

UNDERWOOD HOUSE, PAISLEY.

FIDDES-ALDRIDGE

SIMULTANEOUS Discharging-Charger. The one Machine which Discharges and Charges at One Stroke.

See Advertisement, May 10, p. II. of Centre.

ALDRIDGE AND RANKEN,
39, VICTORIA STREET, WESTMINSTER, S.W.
Telegrams: "MOTORPATHY, LONDON." Telephone: 5118 WESTMINSTER.

EDGAR OF HAMMERSMITH,
SOLICITS YOUR ENQUIRIES FOR GAS APPARATUS.
BLENHEIM WORKS, LONDON, W.
Telegrams: "GASOSO LONDON." Telephone; 14 HAMMERSMITH.

SULPHURIC ACID.

SPECIALLY prepared for Sulphate of AMMONIA Makers by
CHANCE AND HUNT, LIMITED,
Works: OLDBURY, WEDNESBURY, AND STAFFORD.
Address Correspondence and Inquiries to OLDBURY, WORCS,
Telegrams: "CHEMICALS, OLDBURY."

HYDRATED OXIDE OF IRON.

PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no back Pressure.
The Cheapest in the Market.
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D. ANDERSON AND COMPANY,
GAS LIGHTING ENGINEERS AND CONTRACTORS,
18 & 20, FARRINGDON ROAD, LONDON, E.C.
Telegrams: "DACOLIGHT LONDON." Telephone: 2896 HOLBORN.

AMMONIACAL Liquor wanted. CHANCE AND HUNT, LTD., Chemical Manufacturers, OLDBURY, WORCS.
Telegrams: "CHEMICALS."

SPENCER'S PATENT HURDLE GRIDS.

THE very best Patent Grids for Holding Oxide Lightly.
See Illustrated Advertisement, April 5, p. 8.

J. E. C. LORD, Ship Canal Tar Works, Weaste, Manchester. Pitch, Creosote, Benzols, Toluol, Naphtha, Pyridine, all kinds of Cresylic Acid, Carbolic Acid, Sulphate of Ammonia, &c.

SATURATORS made or Repaired. Reasonable Terms (workmanship guaranteed) by a 30 Years' Saturator Maker (Labour and Plant only), at per Hour or Contract. Saturators improved. Perfect Mixing and Noiseless.
DAVIES, General Chemical Plumber and Leadburner, 118, Gallaway Road, SHEPHERD'S BUSH, W.

BRISTOL RECORDING GAUGES AND THERMOMETERS.

J. W. & C. J. PHILLIPS, 23, COLLEGE HILL, LONDON, E.C., and 25, BRIDGE END, LEEDS.

KRAMERS AND AARTS WATER-GAS PLANT.

K. & A. WATER-GAS COMPANY, LTD.
89, VICTORIA STREET, S.W.

GAS TAR wanted, BROTHERTON AND CO., LTD., Tar Distillers. Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, SUNDERLAND, AND WAKEFIELD.

AMMONIA. Consumers in any form are invited to correspond with CHANCE AND HUNT, LTD., Chemical Manufacturers, OLDBURY, WORCS.

GAS-WORKS requiring Extensions should Communicate with FIRTH BLAKELEY, SONS, AND CO., LIMITED, Dewsbury, who make a Speciality of Catering for the Smaller Gas Concerns. Prices Reasonable; quality and results, the *best*. Satisfaction Guaranteed.

CAST-IRON Pipes. Spigot and Socket or Flanged. Special Quality—9 feet or 12 feet Lengths. When buying, Write us.
A. LOWCOCK, Limited, SHREWSBURY.

GAS OILS.

MEADE-KING, ROBINSON, & CO. Represent the Strongest Independent Refineries in America; also Petroleum Spirit for Gas Enrichment. 18, EXCHANGE STREET, MANCHESTER, and 11, OLD HALL STREET, LIVERPOOL.

AMMONIA Waste Liquor Disposal. Purification Plant.
Results Guaranteed. No Working Costs.
JOHN RADCLIFFE, Chemical Engineer, EAST BARNET.

GAS PLANT for Sale—We can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
FIRTH BLAKELEY, SONS, AND COMPANY, LIMITED, Thornhill, DEWSBURY.

F. BOYALL, Contractor for Painting GASHOLDERS, OIL-TANKS, ROOFS, and all kinds of LOFT and other PAINT WORK.

70, Balcorne Street, Well Street, HACKNEY, N.E.

IT is Worth Your While to Buy Direct. The RELIANCE LUBRICATING OIL COMPANY supply the best value in NON-CORROSIVE LUBRICANTS—viz., Motor Waggon Oil, 1s.; Motor Car Oil, 2s.; Engine, Cylinder, and Machinery Oils, 1s.; Axle Oil, 10½d.; Exhauster Oil, 10d.; Special Cylinder Oil, 1s. 4d.; 650 T Cylinder, 2s.; Special Engine Oil, 1s. 4d.; Gas Engine and Oil Engine Oil, 1s. 6d.; Refrigerator, 1s. 9d.; Renown Engine Oil, 11½d.; and Astral Disinfectant, 2s. 6d. per gallon. Barrels free, carriage paid. Solidified Oil, 25s. cwt.
THE RELIANCE LUBRICATING OIL COMPANY, 19 & 20, Water Lane, Tower Street, LONDON, E.C.

APPOINTMENTS.—Ambitious Men of Parts invited to write—
HERBERT GREATOREX,
APPLICATION SPECIALIST,
BEECHWOOD, MATLOCK.
Specimen of many results:—
"Have got the job. Quite a good start.
To you the credit is due, and I think your
fee the best Investment I ever made."
BUSINESS IS REVIVING. WRITE NOW.

MR. G. STANLEY COOPER, B.Sc., F.C.S., Consulting Gas Engineer and Chemist. CORRESPONDENCE CLASSES IN GAS ENGINEERING for City and Guilds Certificates. Success Guaranteed. Lowest Fees. Single Lessons given on Special Subjects.
Address, 12, HARBOUR VIEW, Fowey, CORNWALL.

LEADBURNER (Journeyman), Sul- phate of Ammonia, Leadwork Repairs, &c., Cheap, with Plant. Workmanship Guaranteed. Sixteen Years' References. Worked at Beckton, Sheffield, Dublin, &c.
Address ELLIOTT, 118, Gallaway Road, SHEPHERD'S BUSH, W.

WANTED, a Chief Clerk for the Central Gas Offices. Age not exceeding 35. Commencing Salary, £230.
Apply, by letter, stating Age, Experience, and full Particulars, to R. O. PATERSON, Manager, Gas-Works, CHELTENHAM.

DRAUGHTSMAN Wanted, Experienced in Gas-Works Plant, with knowledge of Retort Work Preferred.
Full Particulars, stating Salary required, to C. & W. WALKER, LIMITED, Midland Iron Works, Donnington, SHROPSHIRE.

TWO Representatives wanted by a well-known House of Lighting Engineers, one with a knowledge of London District, and the other for Eastern Counties and South Coast. Only First-Class Men need Apply.
Address No. 5246, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

METER INSPECTOR.

REQUIRED, an Inspector thoroughly acquainted with the Testing of Meters, Taking Illuminating Power Tests, and the Ordinary Work of Meter Taking. Wages, 35s. per Week.
Copies only of Three recent Testimonials to be forwarded to No. 5244, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

AGENTS WANTED—A First-Class Manufacturing Firm of Incandescent Mantles, making superior Specialities Highly appreciated in England and the Colonies, want LONDON AGENTS to extend their English Trade.
Respectable and very active Firms versed in the Light Business for Home Trade and Export, please address "H.J. 6780," care of NEYROUD AND SONS' ADVERTISING OFFICES, 14/18, Queen Victoria Street, LONDON, E.C.

GASHOLDER Wanted (Capacity 20,000 to 30,000 Cubic Feet) erected Complete. Second-Hand not objected to, but must be in Good Condition.
Send full Particulars and Price, to No. 5245, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS COKE WANTED.

QUOTE Lowest Price on Truck to JOSEPH BOAM, LIMITED, Coke Factors, KING'S LYNN.

FOR SALE—about Five Tons of 12-inch and Five Tons of 10-inch new Socket and Spigot Cast-Iron PIPES—£4 per Ton; also 12-inch and 10-inch BENDS, TEES, COLLARS, and CAPS—£8 per Ton.
State Requirements to the MANAGER, Gas-Works, Chesterton, STAFFORDSHIRE.

GASHOLDERS—Splendid 45 feet dia- meter and New STEEL TANK, fixed Complete to Plan and Specification; also 14 feet and 16 feet Diameter GASHOLDERS, with STEEL TANKS. Can be seen temporarily erected. Re-erected Cheap for immediate Sale.
FIRTH BLAKELEYS, Thornhill, DEWSBURY.

COAL.

THE Salisbury Gaslight and Coke Com- pany invite TENDERS for 1000 to 4000 Tons of GAS COAL, delivered f.o.r. Salisbury, as required over the next Twelve Months.
Tenders to be sent on or before June 9, to Mr. N. H. HUMPHRYS, Gas Engineer, SALISBURY.

GREAT WESTERN RAILWAY.

THE Directors of this Company are prepared to receive TENDERS for the Purchase of:—

GAS TAR AND AMMONIACAL LIQUOR.
FURNACE SLAG, FETTLING, AND MILL SCALE.
TARPAULIN CUTTINGS AND SHEET TIES.

Forms of Tender (upon which alone Tenders will be received) may be obtained on Application to the undersigned, by whom Tenders, marked outside "Tender for Residuals," will be received up to Ten a.m. on Tuesday, the 7th of June.

The Directors do not bind themselves to accept the highest or any Tender.

G. K. MILLS,
Secretary.

Paddington Station,
London, May 19, 1910.

THE Directors of the Glossop Gas Company invite TENDERS for the Supply, during the Year commencing Aug. 1, 1910, of 6000 Tons of Good GAS COAL and 500 Tons of CANNEL, which must be delivered, carriage paid, at the Great Central Railway Station, Glossop.

Forms of Tender may be obtained at the Company's Office.

Sealed Tenders, Specifying the Description of the Coal and the Pit from which it is to be raised, must be sent to the Chairman of the Company not later than Saturday, the 11th of June next.

The Directors do not bind themselves to accept the lowest or any Tender.

J. SIDEBOTTOM,
Secretary.

Gas Offices, Glossop,
May 26, 1910.

THE Corporation of Middleton are prepared to receive TENDERS for the Erection of a STEAM HOIST and GANTRYS in place of their present Coke-Handling Plant.

Specification, &c., and Form of Tender, which will contain a Fair Wages Clause, may be obtained from Mr. C. F. Broadhead, Gas Engineer, Gas-Works, Middleton.

Tenders, addressed to the Chairman of the Gas Committee and endorsed "Steam Hoist," must be delivered at my Office not later than June 18 next.

The Corporation do not bind themselves to accept the lowest or any Tender.

FREDERICK ENTWISTLE,
Town Clerk.

Town Hall, Middleton,
May 26, 1910.

SLOUGH GAS AND COKE COMPANY.

THE Directors are prepared to receive TENDERS for the Supply of 5500 Tons of Best GAS COAL, Screened, Unscreened, or Screened Nuts, to be delivered at the Company's Siding on the Great-Western Railway at Slough in the usual Monthly Quantities as may be required during the period of One Year from the 1st of July, 1910.

Tenders should state Description of Coal and Colliery from where Coal is obtained.

Payment for Coal on or before the 20th of the following Month after delivery.

Tenders to be delivered to the undersigned, endorsed "Tender for Gas Coal," on or before Tuesday, the 7th prox.

ARTHUR THOMAS,
Secretary.

High Street, Slough,
May 25, 1910.

URBAN DISTRICT COUNCIL OF OLDBURY.

(GAS DEPARTMENT.)

THE Gas Committee of the above Council are prepared to receive TENDERS for the Supply of 12,000 Tons of Best Screened GAS COAL for delivery during the Year ending July 31, 1911, in such Quantities and at such times as ordered.

Further Particulars and Tender Forms may be obtained from the undersigned.

Sealed Tenders endorsed "Tender for Gas Coal," to be addressed to the Chairman of the Gas Committee and delivered to the undersigned not later than Saturday, the 18th day of June, 1910.

The Gas Committee do not bind themselves to accept the lowest Tender, and reserve to themselves the right to apportion the whole or any quantity thereof as they may think fit.

By order,
A. COOKE,
General Manager.

Gas-Works, Oldbury,
May 25, 1910.

BOROUGH OF LEIGH.

(GAS AND WATER DEPARTMENTS)

THE Gas and Water Committee of the above Corporation are prepared to receive TENDERS for the Supply of the following GOODS:

(1) 14,000 Tons of Screened and Unscreened GAS COAL, NUTS, and SLACK.
(2) LEAD PIPING (Gas and Water.)
(3) VITRIOL.
(4) LIME.
(5) BENZOL.
(6) WROUGHT-IRON TUBES AND FITTINGS.

Forms of Tender may be had on Application from the undersigned, to whom all enquiries must be addressed; and all Offers must be made on the Official Forms, or they will not be considered.

Sealed and endorsed Tenders must be delivered to Mr. Stanley Wilson, Town Clerk, Town Hall, Leigh, Lancashire, on or before Twelve o'clock noon on Saturday, the 11th day of June, 1910.

The Corporation do not bind themselves to accept the lowest or any Tender, and reserve to themselves the right to divide any Tender.

JAMES GIBSON,
Engineer and Manager.

Gas and Water Offices, Leigh,
Lancashire, May 24, 1910.

BRIDGEWATER COLLIERIES COKE-WORKS.

(THE EARL OF ELLESMERE.)

TENDERS are invited for the Tar produced at the above Works for a period of Six or Twelve Months from the 1st of July, 1910, delivered into Contractor's Tanks at the Bridgewater Colliery Siding, Wharton Hall, on the Pendleton and Hindley Branch of the Lancashire and Yorkshire Railway; or at the Brackley Siding, Little Hulton Mineral Branch of the London and North-Western Railway.

The estimated quantity is about 2600 Tons per Annum.

Tenders, endorsed "Tender for Tar," to be addressed to Mr. THOMAS M. BROWN, Bridgewater Coal Offices, 4, Chapel Walks, MANCHESTER, not later than the 20th of June.

Manchester, May 31, 1910.

BOROUGH OF DEWSBURY.

THE Gas Committee are prepared to receive TENDERS for the Supply and Delivery, at the Gas-Works Siding, Savile Town, Dewsbury, of the following Quantities of Screened GAS COAL, during the period of One, Two, or Three Years commencing on the 1st day of July next.

	Tons.		Tons.
First Year .	22,000 Black Coal	.	1000 Cannel.
Second Year .	22,000 "	.	1000 "
Third Year .	22,000 "	.	1000 "

Tenders must Specify Prices for Delivery by Rail, and be made on Forms to be had on Application to Mr. Geo. Wm. Fligg, Savile Town Gas-Works, Dewsbury, from whom any further Information may be obtained.

Sealed Tenders, endorsed "Tender for Gas Coal," to be sent to me not later than Thursday, the 9th day of June next.

The Committee do not bind themselves to accept the lowest or any Tender.

H. ELLIS,
Town Clerk.

Town Hall, Dewsbury.

LOUGHBOROUGH CORPORATION.

(GAS DEPARTMENT.)

TENDERS FOR TAR AND AMMONIACAL LIQUOR.

THE Gas Committee of the Loughborough Corporation invite TENDERS for the Purchase of the Surplus TAR and AMMONIACAL LIQUOR made at their Works during the Twelve Months from July 1, 1910, to June 30, 1911.

Estimated amount of Tar, 600 Tons; Liquor, 1000 Tons.

The Contractor to state Price for Liquor at 5° Twaddel, and per Ton extra for every ½° above 5°.

The Corporation to deliver both Tar and Liquor into Contractor's Boats at the Derby Road Wharf, Loughborough.

Tenders to be endorsed "Tenders for Tar and Liquor," and addressed and delivered to H. Perkins, Esq., Town Clerk, Town Hall, Loughborough, not later than Friday, the 10th of June.

The Committee do not bind themselves to accept the highest or any Tender.

EDWARD ONIONS,
Engineer and Manager.

May 23, 1910.

LOUGHBOROUGH CORPORATION.

(GAS DEPARTMENT.)

TENDERS FOR LIME.

THE Gas Committee of the Loughborough Corporation invite TENDERS for the Supply of 800 Tons (more or less) of Best Hand-Picked LIME for Purifying purposes, to be delivered at Loughborough Station during the Twelve Months ending June 30, 1911.

Further Particulars may be obtained from the undersigned.

E. ONIONS,
Engineer and Manager.

May 23, 1910.

SUTTON-IN-ASHFIELD URBAN DISTRICT COUNCIL.

(GAS DEPARTMENT.)

TENDERS FOR GAS COAL AND LIME.
TENDERS FOR COKE, TAR, AND AMMONIACAL LIQUOR.
TENDERS FOR GAS METERS.

THE Gas Committee of the above Council are prepared to receive TENDERS for the Supply of 5500 Tons of well Screened GAS COAL, to be free from Shale and Pyrites, and to be delivered at the Town Stations, (Midland or Great Northern Railways), Sutton-in-Ashfield, in such Quantities as the Manager shall from time to time direct between July 1, 1910, and June 30, 1911.

Tenders for Coal to state Price per Ton of 20 cwt. delivered here.

LIME.

Also for the Supply of about 300 Tons of Best Hand-Picked LIME, to be delivered at either of the above Railway Stations, and in such Quantities as the Manager shall from time to time direct between July 1, 1910, and June 30, 1911, and to be free from Stone and other Refuse.

COKE, TAR, AND AMMONIACAL LIQUOR.

Tenders are also invited for the Surplus COKE, TAR, and AMMONIACAL LIQUOR, produced at these Works from July 1, 1910, to June 30, 1911, to be delivered in Purchaser's Tank-Waggons at the Midland or Great Northern Stations, Sutton-in-Ashfield.

GAS-METERS.

The above Council are also prepared to receive TENDERS for the Supply of New Dry, Ordinary, and Automatic METERS to meet their requirements for the ensuing Twelve Months, all Meters to be delivered here Carriage Paid and Guaranteed for Five Years.

No Tender Forms provided.

The Committee do not bind themselves to accept the lowest or any Tender.

Tenders, endorsed, must arrive here not later than the 6th day of June, 1910.

For any further Particulars, Apply to Mr. T. ROBINSON, Gas-Works Manager, SUTTON-IN-ASHFIELD.

SPALDING URBAN DISTRICT COUNCIL.

(GAS DEPARTMENT.)

THE Gas Committee are prepared to receive TENDERS for the Erection in existing Arches of Two Beds of REGENERATOR RETORT SETTINGS.

Full Particulars and other Information can be obtained from the undersigned.

Tenders, endorsed "Retort Settings," to be delivered to me on or before Saturday, the 18th day of June, 1910.

H. R. WIMHURST,
Engineer and Manager.

Gas-Works, Spalding,
May 27, 1910.

ACCRINGTON DISTRICT GAS AND WATER BOARD.

THIS Board invites Tenders for the Surplus TAR and AMMONIACAL LIQUOR which may be produced at the Accrington and Great Harwood Gas-Works of the Board, during the Year from the 1st of July next to the 30th of June, 1911.

The Estimated Quantity of Tar is 2000 Tons, and of Liquor 6000 Tons.

Sealed Tenders, endorsed "Tar and Liquor" addressed to the Chairman of the Board, must be in my hands on or before Monday, the 6th of June.

Forms of Tender may be obtained on Application.

By order,
CHARLES HARRISON,
General Manager.

General Offices, Accrington,
May 19, 1910.

HAVERHILL URBAN DISTRICT COUNCIL.

TENDERS FOR COAL.

THE Haverhill Urban District Council invite TENDERS for the Supply of 600, 1200, or 1800 Tons of Best GAS COAL (Screened or Unscreened), to be delivered free at the Haverhill (Great Eastern Railway) Station in such Quantities and at such periods as may be ordered from time to time between the 1st day of July next and the 30th day of June, 1911.

No Form of Tender is provided, nor will be supplied.

The Council reserve the right to divide the Contract as they think fit and do not bind themselves to accept the lowest or any Tender.

Sealed Tenders, endorsed "Gas," to be delivered to me on or before the 8th of June, 1910.

THOMAS BATES,
Clerk.

Haverhill, May 28, 1910.

BARNSLEY GAS COMPANY.

TENDERS FOR GAS COAL.

THE Directors of the above Company are prepared to receive TENDERS for the Supply of about 16,000 Tons of Screened and Unscreened GAS COAL or NUTS for One Year from the 1st day of July next, in such Quantities as may be required by the Company.

Tenders to state price delivered at the Sidings belonging to the Gas Company at Old Mill and Pontefract Road (both Great Central Railway), also at the Railway Goods Yards, Barnsley.

For Forms of Tender and any other Particulars, Apply to the undersigned.

Sealed Tenders, endorsed "Tender for Coal," to be addressed to the Chairman, and delivered to the undersigned not later than Tuesday, the 7th day of June, 1910.

The Directors reserve to themselves the right to accept the whole or any Portion of any Quantity offered, and do not bind themselves to accept the lowest or any Tender.

W. W. HUTCHINSON,
Engineer and Manager.

Gas Office, Pontefract Road,
Barnsley, May 25, 1910.

BARNSLEY GAS COMPANY.

TAR AND AMMONIACAL LIQUOR.

THE Directors of the above Company invite TENDERS for the Purchase of the Surplus TAR and AMMONIACAL LIQUOR to be produced at their works during a term of One Year commencing July 1 next. Probable Quantities and any other Particulars on Application to the undersigned.

Sealed Tenders, duly endorsed, addressed to the Chairman, to be delivered to me not later than Tuesday, the 7th day of June prox.

The Directors do not bind themselves to accept the highest or any Tender.

W. W. HUTCHINSON,
Engineer and Manager.

Gas Offices, Barnsley,
May 25, 1910.

BRIDGNORTH CORPORATION GAS-WORKS.

TO COLLIERY PROPRIETORS AND OTHERS.

THE Gas Committee are prepared to receive sealed TENDERS for the Supply of Screened GAS COAL or Washed GAS NUTS, including Carriage to the Bridgnorth Railway Station, for One Year from, or soon after, the end of July next.

Evidence as to quality of Coal must accompany each Tender.

The Coal or Nuts must be well Screened or Washed, free from Bats, Binds, and other Refuse, and be freshly got at the time for delivery.

Quantity required, about 2600 tons in proportionate deliveries as directed—say 70 per cent. during Winter months, and 30 per cent. during Summer months.

Sealed and marked Tenders must be sent to the undersigned not later than Saturday, the 18th of June.

The Committee reserve to themselves the right to divide the Quantity into Two or more Contracts, and do not bind themselves to accept the lowest or any Tender.

Official Forms for Tender are not furnished.

By order,
J. H. COOKSEY,
Town Clerk,
Secretary.

Bridgnorth, May 27, 1910.

CIRENCESTER GAS COMPANY, LIMITED.

THE Directors are prepared to receive TENDERS for the Supply of 4000 to 5000 Tons of GAS COAL to be delivered free to their Siding at the Watermoor Station of the Midland and South Western Junction Railway Company during the Twelve Months commencing July 1, 1910, at such times and in such Quantities as may be required by their Manager.

Tenders to be sent in by June 2 next, Forms for which can be obtained from

J. P. BEECHAM,
Secretary.

12, Silver Street, Cirencester,
May 9, 1910.

COUNTY BOROUGH OF BOLTON.
(GAS DEPARTMENT.)

TENDERS FOR COAL.

THE Gas and Lighting Committee invite TENDERS from Colliery Proprietors only, for the Supply of Screened and Unscreened GAS COAL, COBBLES, and NUTS, required during the Year ending June 30, 1911.

Specifications and Forms of Tender may be obtained on Application to the Superintendent, Gas-Offices, Bolton.

Sealed Tenders, endorsed "Tender for Coal," and addressed to the Chairman of the above Committee, to be delivered at the Gas Offices, Bolton, not later than Nine a.m., on Friday, June 3, 1910.

SAMUEL PARKER,
Town Clerk.

Town Hall, Bolton,
May 18, 1910.

PETERBOROUGH GAS COMPANY.

TENDERS FOR BEST SILKSTONE GAS COAL.

THE Directors of the above Company invite TENDERS for One Year's Supply of Best Screened Silkstone NUTS. Delivery to commence July 1, 1910.

The Tenders must state
Price per Ton in Waggons at Pit,
Railway Rate to Peterborough,
Waggon Hire to Peterborough.

Tenders must be sent in by June 11 next, endorsed "Coal," and addressed to the Chairman of the Company, Gas-Works, Peterborough.

The Directors do not bind themselves to accept the lowest or any Tender.

Please note: Special Tender Forms are not provided.

JOHN BARTON,
Secretary and Manager.

Peterborough, May 10, 1910.

CHESTER UNITED GAS COMPANY.

TENDERS FOR GAS COAL.

THE Directors of the above Company invite TENDERS for the Supply of about 23,000 Tons of GAS COAL for One, Two or Three Years from the 1st day of July next, in such Monthly Quantities as may be required by the Company.

Special Conditions and Forms of Tender can be obtained from, and sealed Tenders endorsed "Tender for Coal," must be addressed to the undersigned, not later than Monday, the 6th of June prox.

The Directors reserve to themselves the right to accept the whole or any portion of any quantity offered, and do not bind themselves to accept the lowest or any Tender.

By order,
FRED. A. PYE,
Secretary and General Manager.

Gas Offices, Cuppin Street,
Chester, May 19, 1910.

NEWPORT (MONMOUTHSHIRE) GAS COMPANY.

TENDERS FOR COAL.

THE Directors invite Tenders for the Supply of about 30,000 Tons of Best GAS COALS, for Twelve Months, commencing the 1st of July, 1910, to be delivered on the Company's Sidings at their Mill Street or Crindau Works, in such Quantities and at such times as may be directed by the Company's Engineer, from whom further Information may be obtained.

Tenders will be received for the whole or part of the above Quantity.

Tenders, endorsed "Coals," to be delivered at the Offices of the Company not later than the 15th of June, 1910.

The Directors do not bind themselves to accept the lowest or any Tender.

By order,
T. H. HAZELL,
Secretary.

Newport, Mon.,
May 19, 1910.

TAUNTON GASLIGHT AND COKE COMPANY.

TENDERS FOR COAL.

THE Directors are prepared to receive TENDERS for COAL for Delivery over One Year from the 1st of July next.

Particulars may be obtained from the Manager, to whom Tenders, sealed and endorsed, should be sent before June 6 next.

A. EDWARDS,
Secretary and Manager.

May 23, 1910.

THE Proprietor of Letters Patent No. 12,751 of 1907, relating to "Apparatus for Washing and Cooling Gas," desires to DISPOSE of the Patent, or to Grant LICENCES to interested Parties on Reasonable Terms, with a view to the adequate Working of the Patent in this Country.

Enquiries to be addressed to CRUIKSHANK AND FAIRWEATHER, LIMITED, International Patent Agency, 65-66, Chancery Lane, LONDON, W.C.

THE

Institution OF Gas Engineers.

THE

ANNUAL GENERAL MEETING

WILL BE HELD ON

TUESDAY, JUNE 14 (10.30 a.m.),
WEDNESDAY, JUNE 15 (10 a.m.),
AND
THURSDAY, JUNE 16 (10 a.m.),
AT THE

INSTITUTION OF MECHANICAL ENGINEERS,
STOREY'S GATE, ST. JAMES' PARK, WESTMINSTER,

By kind permission of the Council of that body.

The Chair will be taken by the President,

JAMES W. HELPS, Esq., M.Inst.C.E.

In connection with the Meeting, a Visit of Inspection to the Croydon Gas-Works will take place on Friday, June 17.

WALTER T. DUNN,
Secretary.

THE BENEVOLENT FUND.

The Annual General Meeting of the Contributors to the Benevolent Fund will be held at the Institution of Mechanical Engineers on Wednesday, the 15th of June, at Ten a.m.

39, *Victoria Street, Westminster, S.W.*,
May 23, 1910.

THE BRISTOL GAS COMPANY.

TENDERS FOR GAS COAL.

THE Directors of the above Company are prepared to receive TENDERS for the Supply of their requirements of GAS COAL during the period ending June 30, 1911.

Particulars and Forms of Tender may be obtained upon Application to the undersigned, to whom also Tenders, sealed and endorsed "Tender for Coal," must be delivered not later than Ten a.m. on Wednesday, the 8th day of June, 1910.

JOHN PHILLIPS,
Secretary.

Chief Offices, Colston Street,
Bristol, May 27, 1910.

NEWPORT (MONMOUTHSHIRE) GAS COMPANY.

SALE BY TENDER OF £16,000 CONSOLIDATED (5 PER CENT.) STOCK.

(MINIMUM PRICE, £112 PER £100 STOCK.)

THE Directors invite Tenders for the Purchase of the above-mentioned CONSOLIDATED STOCK of the Company, in Lots of £100 each, to be paid up in full on or before June 30, 1910.

The Stock bears a Maximum Dividend of £5 per Cent. per Annum.

Full Maximum Dividends have been paid by the Company for upwards of Fifty Years.

Sealed Tenders must be delivered not later than Ten o'clock a.m. on Friday, the 17th of June, 1910, to the undersigned, from whom Particulars and Conditions of Sale may be obtained.

By order,
T. H. HAZELL,
Secretary.

Gas Offices, Newport, Mon.,
May 19, 1910.

FELIXSTOWE GASLIGHT COMPANY.
(INCORPORATED BY ACT OF PARLIAMENT, 1904.)

ISSUE OF £2000 ADDITIONAL ORDINARY STOCK.

RANKING for a Standard Dividend of 7 per cent., subject to the Sliding Scale equally with the existing similar Stock, in lots of

£5 EACH OR MULTIPLES OF £5

Dividend Payable Half-Yearly on March 1 and September 1.

The Directors of the Company invite TENDERS for the above, to be addressed to the Secretary, and delivered at the Office, Hamilton Road, Felixstowe, not later than Noon, on Friday, June 10, 1910, in envelopes endorsed, "Tender for Additional Ordinary Stock."

Tenders must be upon Special Forms, which may be had upon Application to the Secretary, from whom also full Particulars of the issue may be obtained.

The Directors do not bind themselves to accept the highest or any Tender.

The issue will be subject to a reserved price, and in accordance with the Provisions of the Company's Act of Parliament.

F. M. PATERNOSTER,
Secretary.

Hamilton Road, Felixstowe,
May 23, 1910.
Last day for receiving Tenders, June 10, 1910.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MESSRS. A. & W. RICHARDS beg to notify that their SALES BY AUCTION of NEW CAPITAL ISSUED UNDER PARLIAMENTARY POWERS, and of STOCKS and SHARES belonging to EXECUTORS and other PRIVATE OWNERS in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES, take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing New Capital, and also for including other Gas and Water Stocks and Shares in these Periodical Sales, will be forwarded on Application to MESSRS. A. & W. RICHARDS, at 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
ASCOT DISTRICT GAS AND ELECTRICITY COMPANY.

NEW ISSUE OF 350 £10 NEW ORDINARY SHARES.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, June 14, at Two o'clock, in Lots.

Particulars of the AUCTIONEERS, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
BRENTWOOD GAS COMPANY.

NEW ISSUE OF £3000 ADDITIONAL STOCK.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, June 14, at Two o'clock, in Lots.

Particulars of the AUCTIONEERS, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
GUILDFORD GASLIGHT AND COKE COMPANY.

NEW ISSUE OF £5000 ORDINARY STOCK,
AND
£2500 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, June 14, at Two o'clock, in Lots.

Particulars of the AUCTIONEERS, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
EAST GRINSTEAD GAS AND WATER COMPANY.

NEW ISSUE OF 400 £10 "C" SHARES,
AND
£1000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, June 14, at Two o'clock, in Lots.

Particulars of the AUCTIONEERS, 18, FINSBURY CIRCUS, E.C.

THE GASLIGHT AND COKE COMPANY.

NOTICE is Hereby Given, that the TRANSFER BOOKS of this Company, so far as they relate to DEBENTURE STOCK and BONDS, WILL BE CLOSED at Four o'clock p.m., on Friday, the 10th prox., for the Half Year ending on the 30th prox., and WILL BE RE-OPENED on the Morning of Saturday, the 11th prox.

The Interest for the Half Year will be payable on the 1st of July next to the Proprietors registered on the closing of the Books.

By order,
HENRY RAYNER,
Secretary.

Chief Office: Horseferry Road,
Westminster, S.W., May 27, 1910.

MALTA AND MEDITERRANEAN GAS COMPANY, LIMITED.

TO THE SHAREHOLDERS.

NOTICE is Hereby Given, that the ORDINARY GENERAL MEETING of the Shareholders of this Company will be held at the Offices, 59 & 60, Gracechurch Street, London, E.C., on Tuesday, the 14th of June, 1910, at Twelve o'clock Noon, for the purpose of receiving the Report of the Directors and the Accounts for the Year ended the 31st of March, 1910, and for the Transaction of the General Business of the Company.

One of the Directors, Mr. Stephenson Robert Clarke, retires from Office, and offers himself for Re-election.

The Auditors, Mr. Robert Hesketh Jones and Mr. Thomas Guyatt, retire, and offer themselves for Re-election.

The TRANSFER BOOKS WILL BE CLOSED from the 31st of May until the day of the Meeting, both days inclusive.

By order of the Board,
A. W. COOPER,
Secretary.

59 & 60, Gracechurch Street, E.C.,
May 24, 1910.

THOMAS DUXBURY & CO.,
16, DEANSGATE, MANCHESTER.
Best Gas Coal and Cannel, giving High Illuminating Power, Large Yield per ton, and reasonable in Price.
Telegrams: "DARWINIAN, MANCHESTER."
Telephone 1806.

TROTTER, HAINES, & CORBETT,
BRETTELL'S ESTATE, LIMITED,
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.

Manufacturers of GAS RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

LONDON OFFICE: E. C. BROWN & Co., LEADENHALL CHAMBERS, 4, ST. MARY AXE, E.C.

MIRFIELD GAS COAL.
UNEQUALLED.
Sperm Value 878·85 lbs. per Ton.

Please apply for Price, Analyses, and Report, to the
MIRFIELD COLLIERY COMPANY,
RAVENSTHORPE, NEAR DEWSBURY.
LONDON: 16, Park Village East, N.W.

JOHN HALL & CO. OF STOURBRIDGE,
LIMITED,
STOURBRIDGE,
Manufacturers of
FIRE-BRICKS, LUMPS, TILES,
GAS RETORTS,
And every description of Fire-Clay Goods.
RETORTS CAREFULLY PACKED FOR SHIPMENT.

NEWBATTLE CANNEL.
Highest Results in Gas, & Excellent Coke.
QUOTATIONS ON APPLICATION TO
THE LOTHIAN COAL COMPANY,
LIMITED,
NEWBATTLE COLLIERIES,
NEWTONGRANGE, MIDLOTHIAN.

'BUFFALO' INJECTOR
Operated Entirely by One Handle.
Class A lifts 24 ft.
Class B lifts 12 ft.

SEND FOR LIST.
Telegrams: "Temperature London." Tel. No. 12,455 Central.
GREEN & BOULDING, — LIMITED, — 28, New Bridge St., LONDON, E.C.

HEATHCOTE GAS COAL
from the
GRASSMOOR COLLIERIES,
CHESTERFIELD.
Rich in Illuminating Power and Yield of Gas.
Above the Average in Weight and Quality of Coke.
Maintains a High Standard in Residuals.

LUX'S
Gas Purifying Material
Is now used in many Gas-Works throughout Scotland with gratifying success.
FRIEDRICH LUX
Ludwigshafen-am-Rhein
Sole Agent for Scotland:
DANIEL MACFIE
1, North Saint Andrew Street, EDINBURGH
Telegrams: "GASLUX, EDINBURGH"
Descriptive Pamphlet on Application.

THOMAS TURTON
AND SONS, LIMITED,
SHEAF WORKS, SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
FOR ENGINEERS.
STEEL OF ALL DESCRIPTIONS.
SCREW STOCKS, TAPS AND DIES, SPANNERS, RATCHET BRACES, LIFTING JACKS ANVILS, VICES, AND ENGINEERS' TOOLS GENERALLY.
London Office:
90 CANNON STREET E.C.

LEAD WOOL
Is sent out in Skeins all ready for use.
Every Skein of equal weight and length.
The Lead Wool Joint is built up evenly all the way through.
Lead Wool requires no melting and can be used in water without risk.
Lead Wool Joints are Twice as Strong as Cast Lead Joints and cost 33⅓ per cent. less.
THE LEAD WOOL CO., LTD., SNODLAND, KENT.
Telegrams: "STRENGTH, SNODLAND." Telephone 199 SNODLAND.

EVERITT'S Patent
TAR-FOG EXTRACTOR
AND
NAPHTHALENE REMOVER.
SOLE MAKERS:
ROBERT DEMPSTER & SONS,
ROSE MOUNT IRON-WORKS, LTD.,
ELLAND, Yorks.

HARRIS & PEARSON,
STOURBRIDGE, ENGLAND
MANUFACTURERS OF
FIRE-CLAY GAS-RETORTS, FIRE-BRICKS, LUMPS, & TILES of Every Description.
GLAZED BRICKS AND PORCELAIN BATHS.

THE WIGAN COAL & IRON CO., LIMTD.,
Are the exclusive Owners of the well-known HAIGH HALL & KIRKLESS HALL GAS COAL COLLIERIES, Wigan, and of the Manton Steam and House Coal Collieries, Worksop, Notts, and supply the well-known Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, Cannel Nuts, House and Steam Coals, &c.
MIDLAND AND WEST OF ENGLAND DISTRICT OFFICE: *6, CORPORATION STREET, BIRMINGHAM—Sole Agent: A. C. SCRIVENER.*
Telegraphic Address: "WIGAN, BIRMINGHAM." Telephone: No. 200.
LONDON DISTRICT OFFICE: *6, STRAND, LONDON—C. PARKER & SON, Sole Agents.* Telegraphic Address: PARKER, LONDON."

GRAETZIN LIGHT

Important Improvements.

BURNERS.

1. **20-Candle Power more light** without increase in the consumption of gas.
2. **Patent Gas Adjuster;** cannot get out of order.
3. **Automatic Gas Regulator,** ensures a constant and unvarying pressure of 35 mm., guarantees a steady light, at the same time obviating waste of gas and blackening of the burner.
4. **Accurate Regulation of the Air Supply.**
5. Burners will be supplied either with Gas Adjuster or Automatic Gas Regulator.
6. The brass casing is heatproof, and, if occasionally cleaned with warm water, will not become discoloured.

LAMPS.

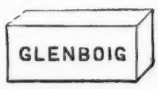
From Lamps with more than one burner, the injectors can be removed from the outside, without taking the lamps to pieces.

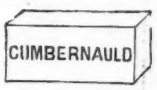
THE GLENBOIG UNION FIRE-CLAY CO., LTD.

GLENBOIG FIRE-BRICKS AND GAS-RETORTS.

Every Genuine Glenboig Brick, Block, Gas-Retort, &c., is legibly stamped with one or other of the Glenboig Company's Registered Trade Marks, as here shown.

TRADE MARKS.





The Glenboig Trade Marks are imitated, and the Glenboig Name unfairly used by Makers of a lower Class of Goods, which, when sold under their own name, command much lower prices.
The Genuine Brand, Stamped on the Goods, is the only Reliable Guarantee to the Purchaser.

GAS-RETORTS, FIRE-BRICKS, BLOCKS, &c., &c.

The SPECIAL BRICKS used in the Construction of Gas Furnaces for Heating Retorts.

Works: GLENBOIG, LANARKSHIRE.
Offices: 48, West Regent St., Glasgow.

56 Prize Medals and Diplomas of Honour.
Highest Award wherever exhibited.

The GLENBOIG BRICKS, BLOCKS, AND RETORTS combine, in the highest degree, the qualities of not melting, and not splitting, when subjected to the highest heats and most sudden changes of temperature, and are, in consequence, found to be economical, even in districts where the local bricks can be had at half the price.

Undernoted we give a Table of Analysis and Physical Characteristics of a sample of Glenboig Fire-Clay by J. T. Norman, London; and, in submitting a report from a responsible and reliable public analyst, we would here draw attention to the unreliable character of some recently published analyses where a manufacturer selects not only his own samples, but also those of his competitor, and has them treated by a private analyst. SUCH STATEMENTS ARE ALTOGETHER UNTRUSTWORTHY.

ANALYSIS OF GLENBOIG FIRE-CLAY.

By JOHN T. NORMAN, Esq., F.C.S., &c., The City Central Laboratory, LONDON.

THE GLENBOIG UNION FIRE-CLAY CO., LTD., GLENBOIG, SCOTLAND.

23, LEADENHALL STREET,
LONDON, E.C., September 21st, 1909.

DEAR SIRS,

I have completed the investigation of the samples of Clay received from you on the 10th inst., and now beg to report the results.

CHEMICAL ANALYSIS.

	Raw.	Fired.
Silica, free	3·03	3·49
Silica, combined	43·20	49·77
Alumina	36·55	42·16
Ferric oxide	1·80	2·08
Titanic oxide	1·30	1·50
Lime	trace	trace
Magnesia	trace	trace
Alkaline oxides	trace	trace
Sulphates as trioxides	0·92	1·06
Loss on Ignition	13·20	—
	100·00	100·00

PHYSICAL RESULTS.

Density	2·65
Volume weight	1·90
Porosity	15·4 %
Linear shrinkage at 100° C.	3·70%
,, ,, ,, 1050° C.	4·76%
,, ,, Total	8·46%
Volume shrinkage at 100° C.	10·7 %
,, ,, ,, 1050° C.	12·6 %
,, ,, Total	23·3 %
Plasticity	20·0 %
Fire Stability	1850° C. equiv. to 3362° F. (SEGER CONE 36.) (New Scale CONE 38.)

(Signed) J. T. NORMAN.

This Clay is remarkable for its high percentage of Alumina and for the almost complete absence of ingredients tending to lower the refractory properties; its fire stability is extremely high. For some years past I have been urging clients who are working the Clays of the Coal Measures to search for such a material, but you are the first to discover a supply. The possession of this Clay places you in a unique position amongst the manufacturers of refractory goods throughout the world, and I have no doubt will, if duly exploited, enable you to drive out of the market the large quantities of foreign fire-bricks which are being poured into this country for use in the construction of bye-product ovens and for other purposes.—I am, yours faithfully,

JOHN T. NORMAN.

METROPOLITAN GAS METERS, LIMITED,

SOLE MAKERS AND LICENSEES OF THE

"Simplex" AUTOMATIC GAS LIGHTER AND EXTINGUISHER.

Some of its Special Advantages are:

1. It is instantaneous in Lighting and Extinguishing without shock to Mantle, and can be set to its pre-determined times in a few seconds.
2. The Mechanism will act correctly, even though the Lamp-post and Controller be out of the perpendicular.
3. **THE VALVE.**—As this never leaves its seat, and the gas-ways being away from the seating, no impurities can collect between the valve and the seating, and by simply removing a small cap, the gasways can be freed of Naphthalene or any other matter.
4. The leakage of gas into the Clock Mechanism and its resultant troubles are entirely done away with.
5. Vibration of any description will not cause the Mechanism to operate prematurely.
6. The "Simplex" Clock also has the advantage of a Lever Escapement.

PRICES AND PARTICULARS ON APPLICATION.

OFFICES AND WORKS AT
Hyson Green, Nottingham.
Telegraphic Address: "Gasometer Nottingham." Telephone: 201X Nottingham.

LONDON DEPOT:
Malt Street, Old Kent Road, S.E.
Telegraphic Address: "Gasometer London." Telephone: 2044 Hop.

JOSEPH EVANS & SONS, CULWEL WORKS, WOLVERHAMPTON.

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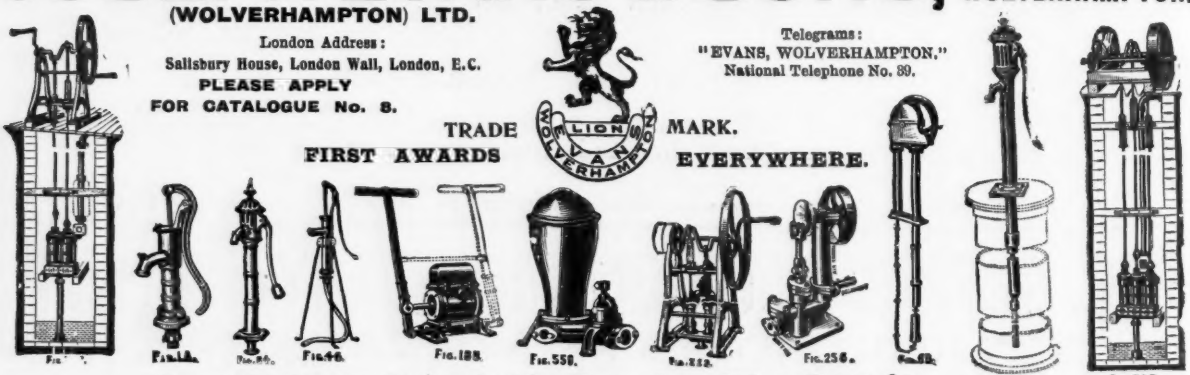

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PIG IRON (special quality) for Engine Cylinders. GAS COAL famous for its Unrivalled excellence.

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Welsbach LIGHT

Inverted Arc Lamp, Fig. 623.

Storm Proof—

For Exterior Lighting.

Welsbach-Kern

(Patent) Inverted System

BRITISH MADE.

BRITISH MADE.

Height over all.

1-light . . .	1 ft. 8 ins.
2-light . . .	2 ft. 4 ins.
3-light . . .	2 ft. 4 ins.
4-light . . .	2 ft. 7 ins.

Width over all.

1-light . . .	1 ft. 1 in.
2-light . . .	1 ft. 5 ins.
3-light . . .	1 ft. 5 ins.
4-light . . .	1 ft. 8 ins.

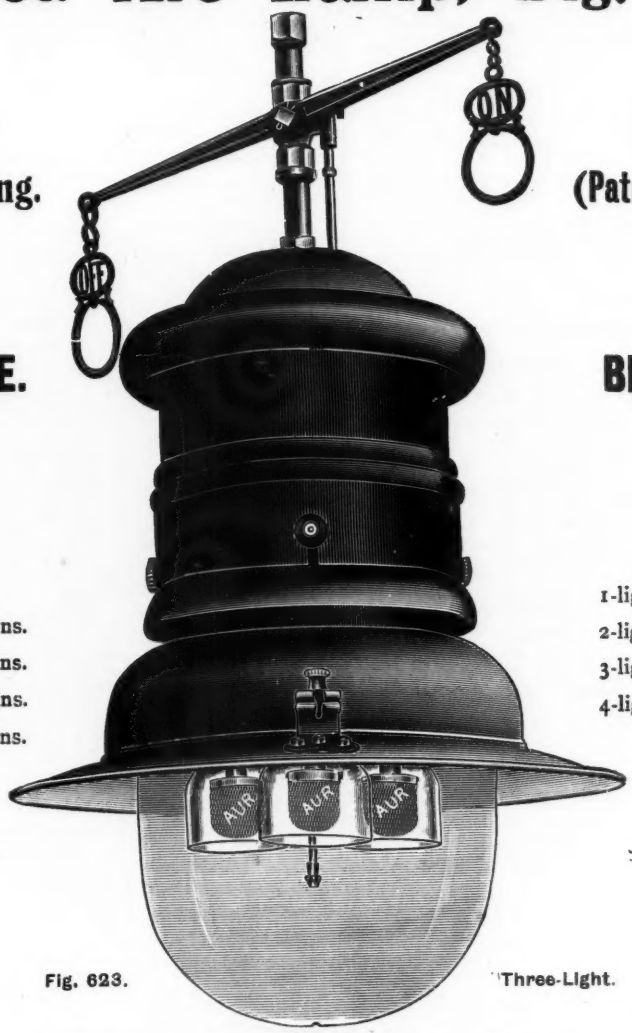

Fig. 623. Three-Light.

ENAMELLED Green Steel Casing, fitted with Welsbach-Kern Inverted Burners, Gas and Air Regulators operated from outside. Sliding Door to give access to Burners for cleaning purposes. Fitted with Magnesia Nozzles, Welsbach Mantles, and Glass Mantle Protectors. Complete as shown. Highly efficient and regenerative.

	Gas per hour.	*C.P.*	*Steel.*	*Copper Case.*		*Gas per hour.*	*C.P.*	*Steel.*	*Copper Case.*
1-light	4 feet	125	**30/-**	**5/-** extra.	3-light	12 feet	400	**52/6**	**6/-** extra.
2-light	8 feet	260	**47/6**	**6/-** extra.	4-light	16 feet	550	**72/6**	**9/-** extra.

All on or off, or One light on and the rest off, **7/6** per Lamp extra. Cup and Ball, **3/6** per Lamp extra.

RENEWALS.

Glass Mantle Protectors (Fig. 623) **3/4½** per dozen, or in case lots of 5 gross, **33/-** per gross.

	1-Light.	*2-Light.*	*3-Light.*	*4-Light.*		*1-Light.*	*2-Light.*	*3-Light.*	*4-Light.*
Clear Glass Globes, each	**2/3**	**5/9**	**5/9**	**9/-**	Wired Globes, extra each	**2/-**	**2/-**	**2/9**	**3/6**
" " " In Case lots per dozen.	**19/6**	**57/9**	**57/9**	**93/-**	Parabolic Reflector, extra "	**3/6**	**6/-**	**7/6**	Not made
Case contains . .	*80*	*18*	*18*	*12*	Welsbach Mantles, each **6d.** subject as usual.				

The Welsbach Mantles for Upright lighting are "C," "CX," and "Plaissetty," price **4½d.** each.

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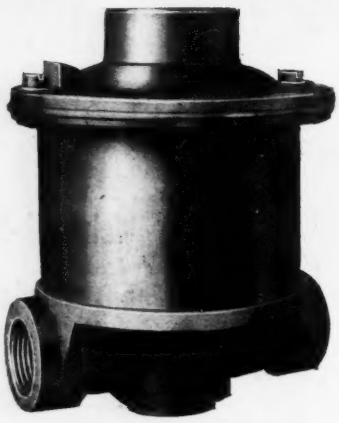

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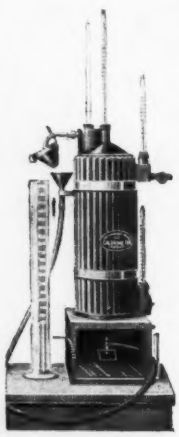

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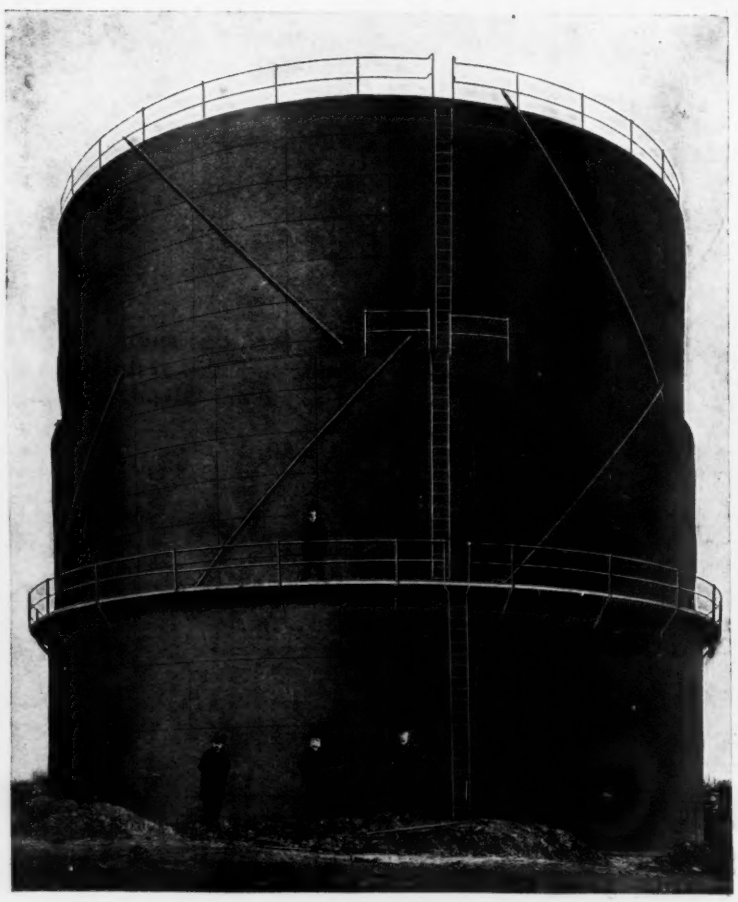

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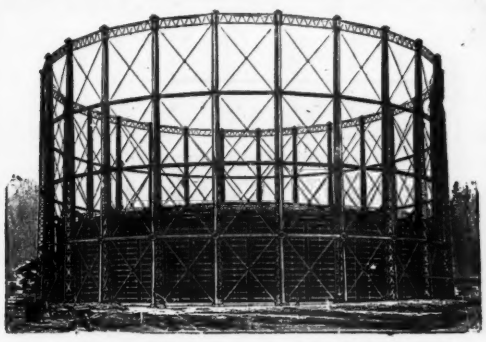

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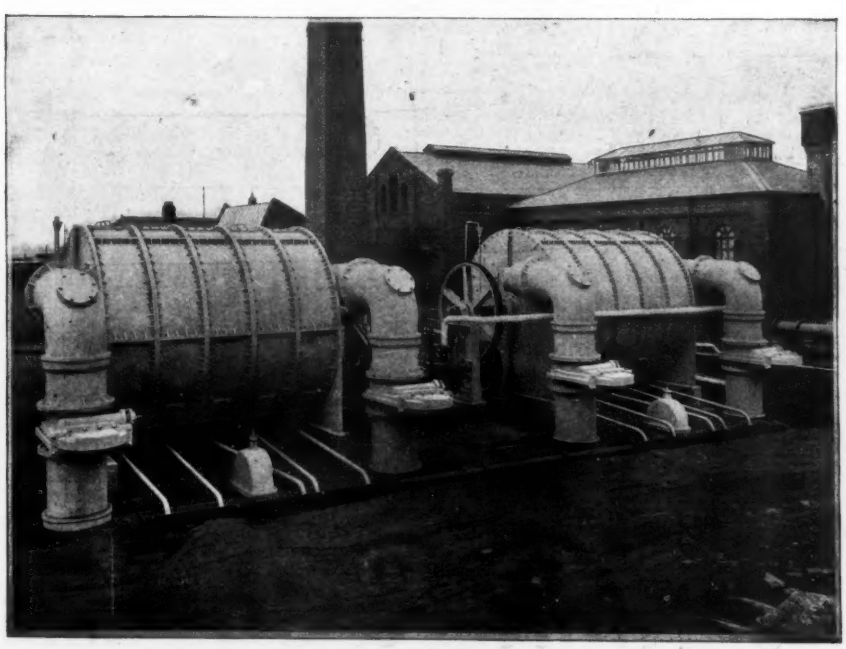

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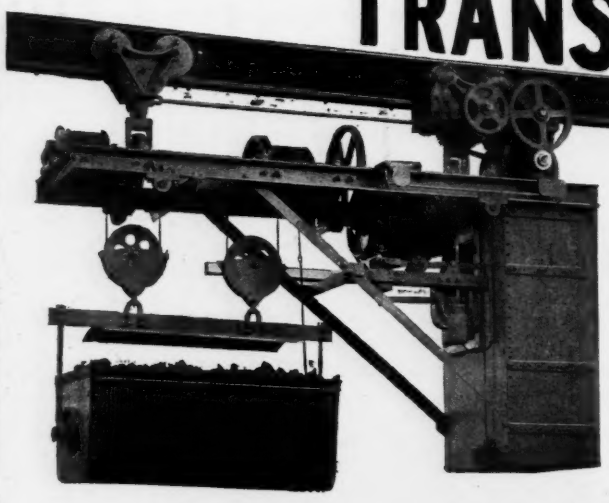

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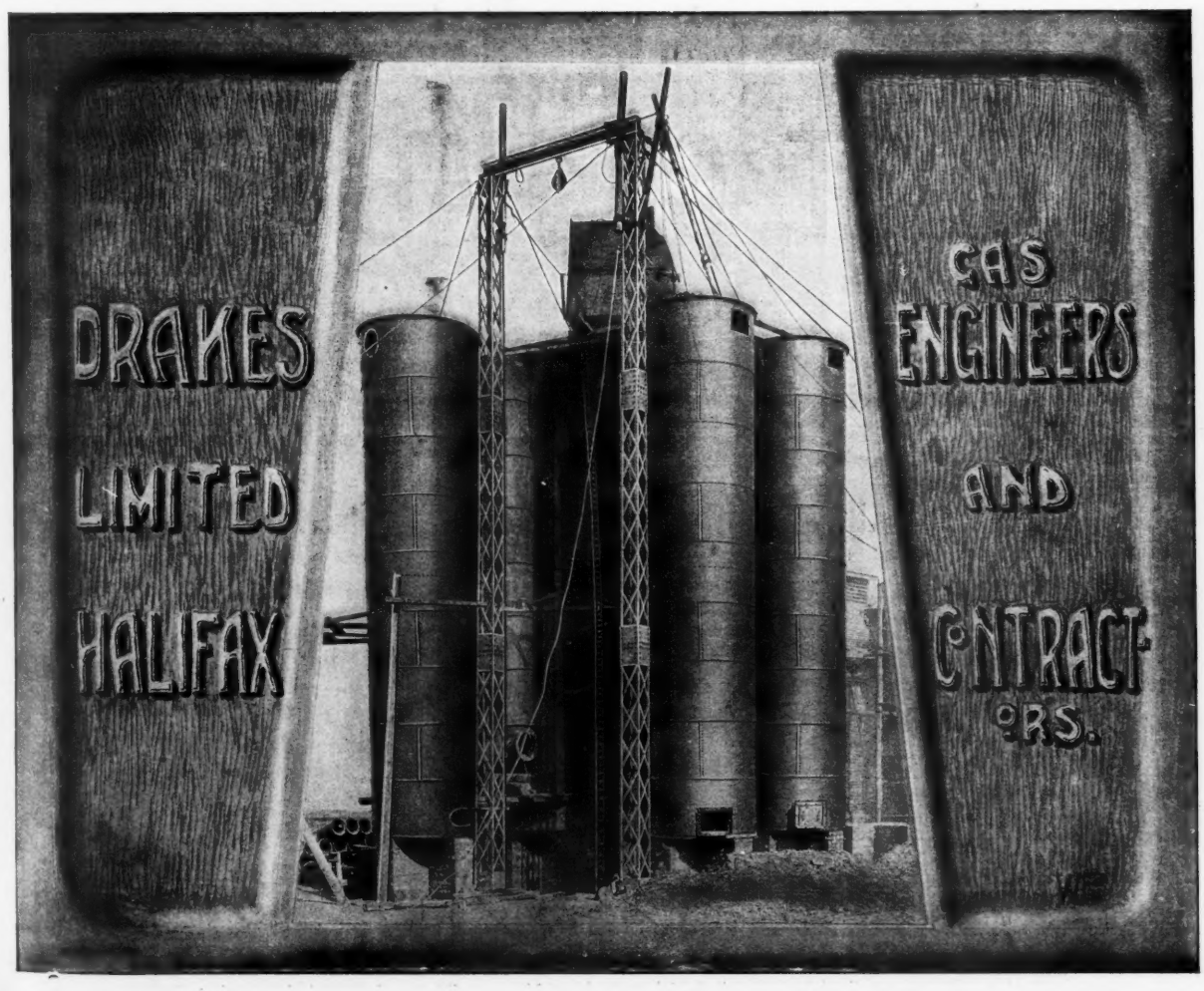

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